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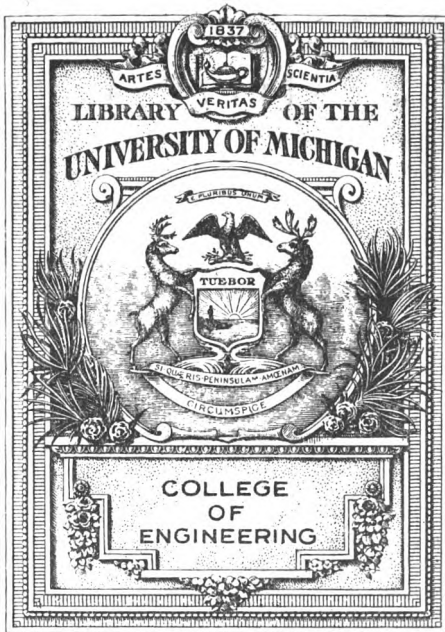


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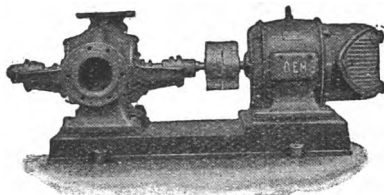
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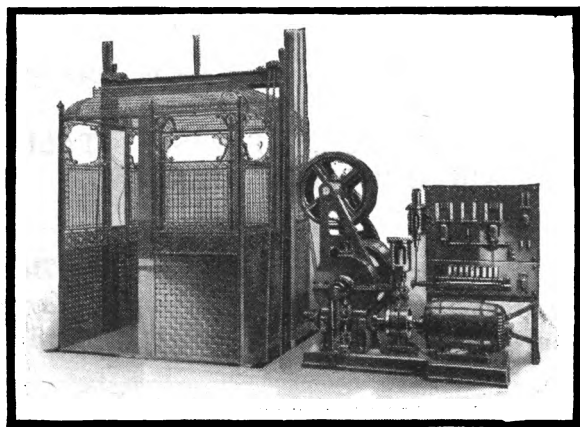
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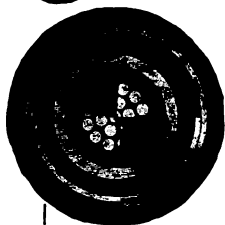
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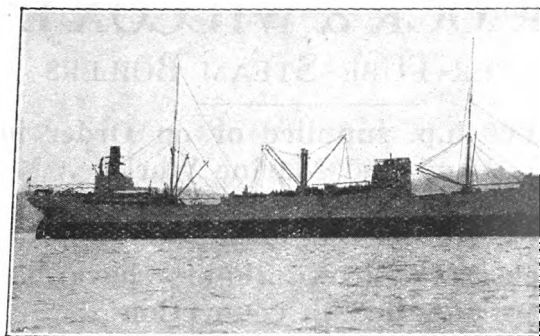
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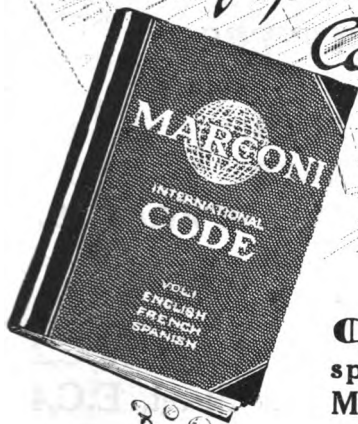
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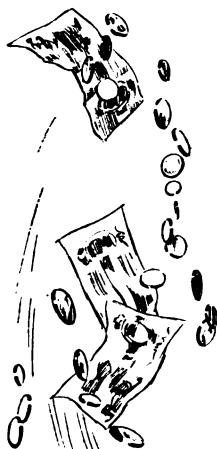
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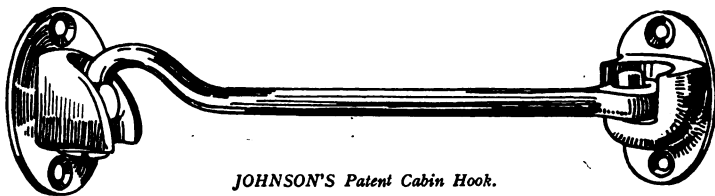
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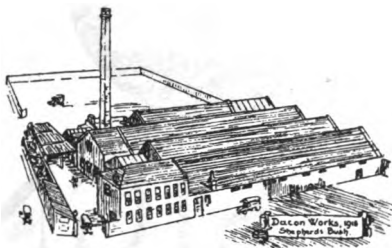
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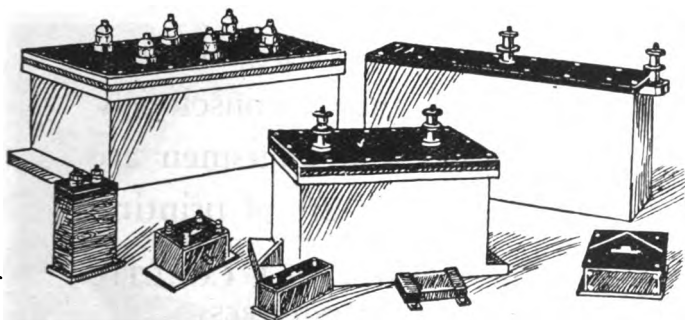
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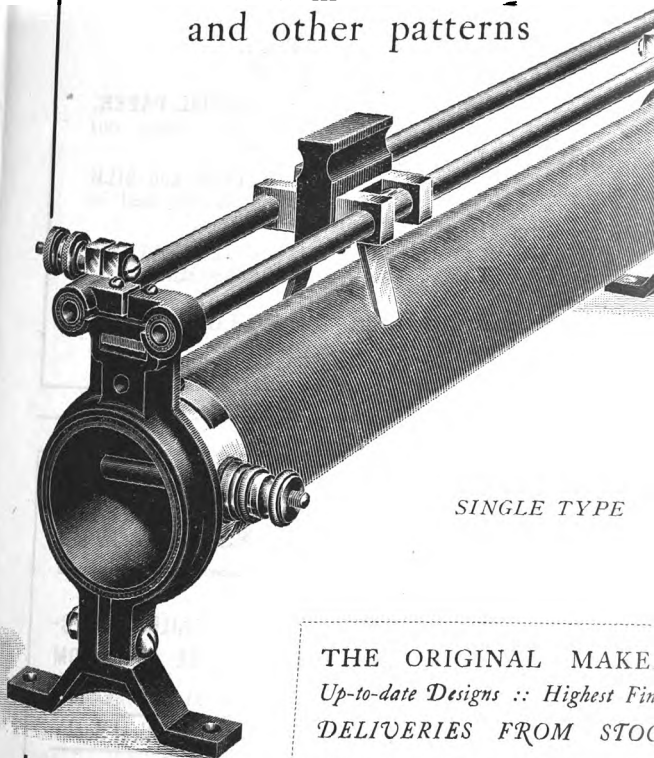
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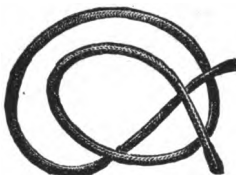
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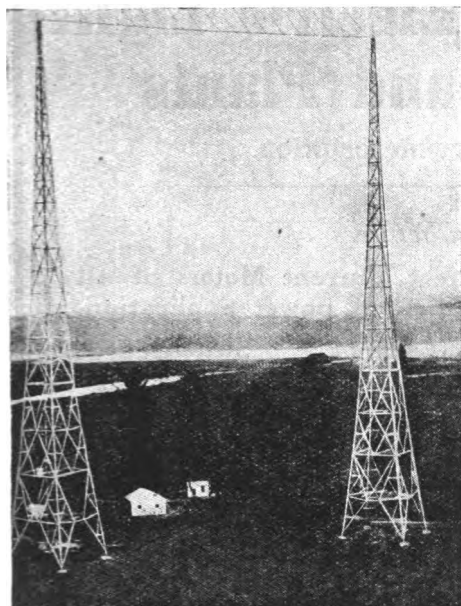
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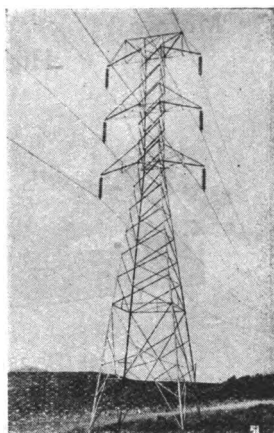
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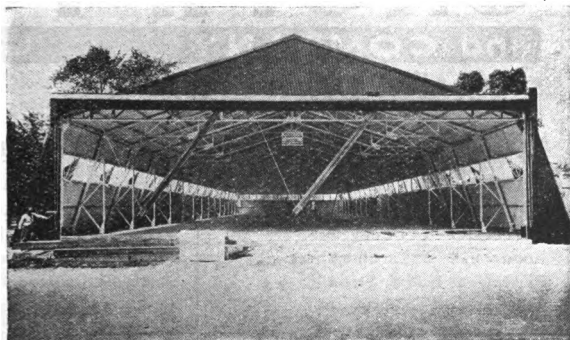
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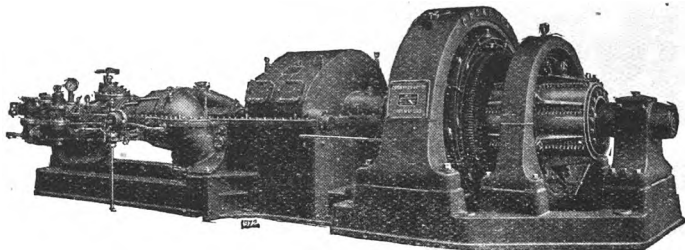
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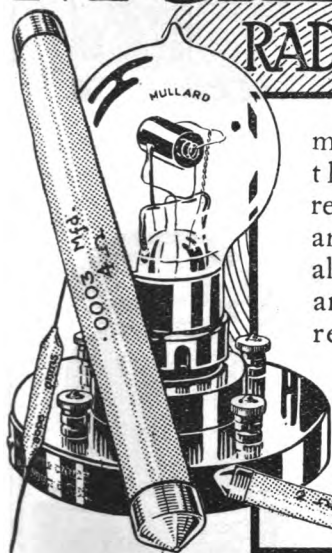
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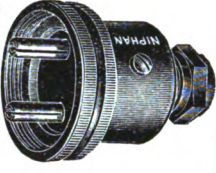
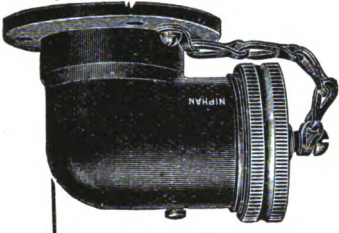
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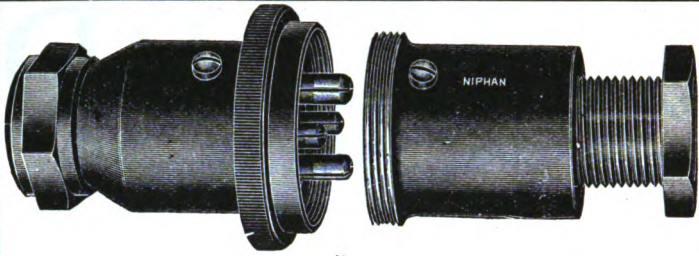
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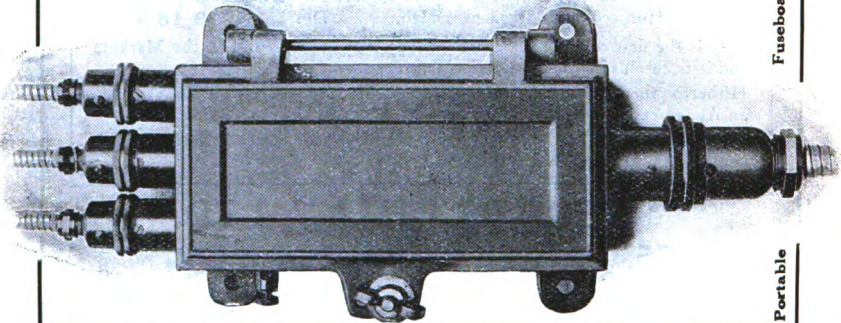
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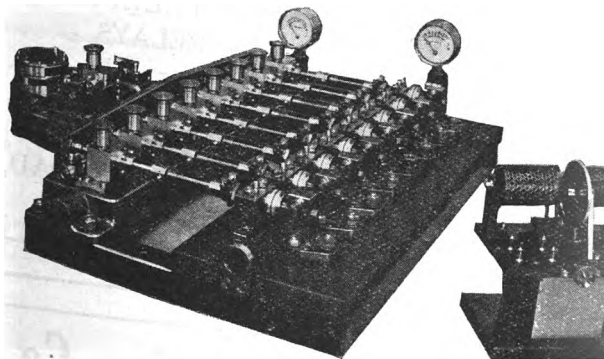


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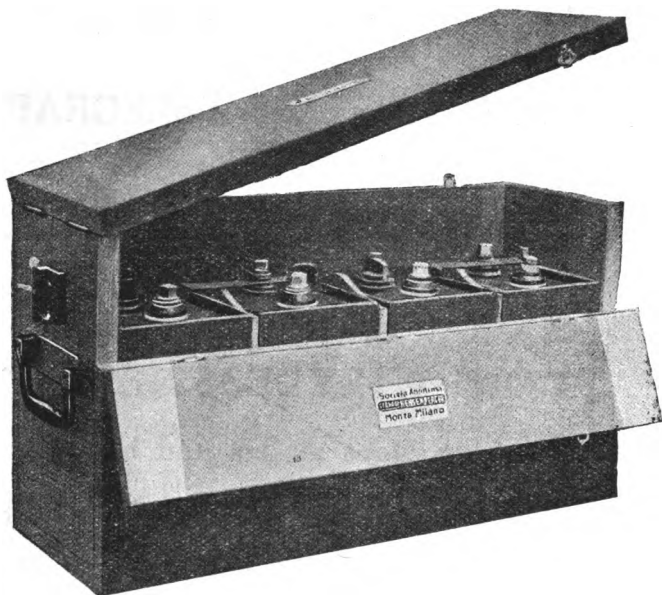
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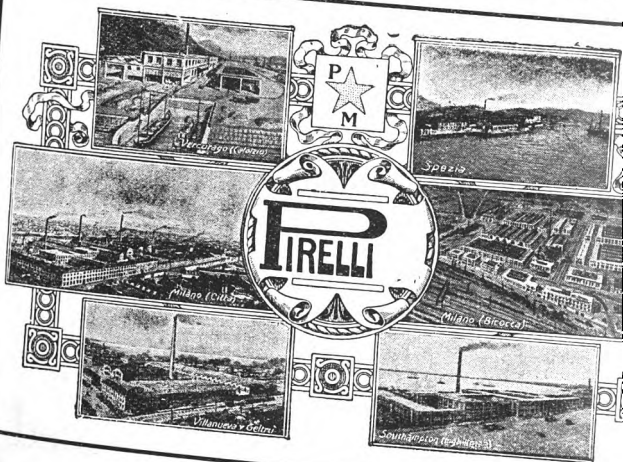
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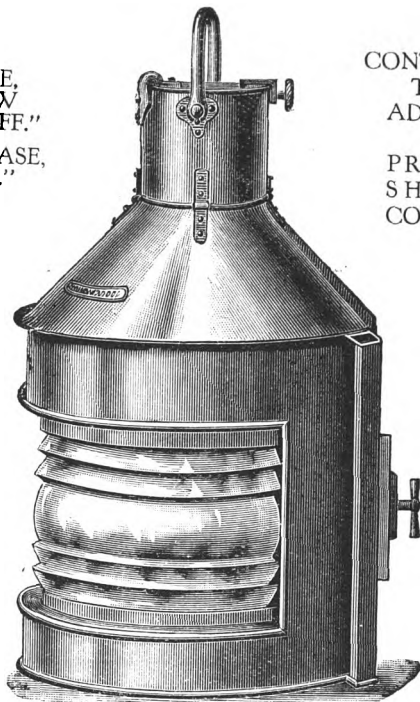
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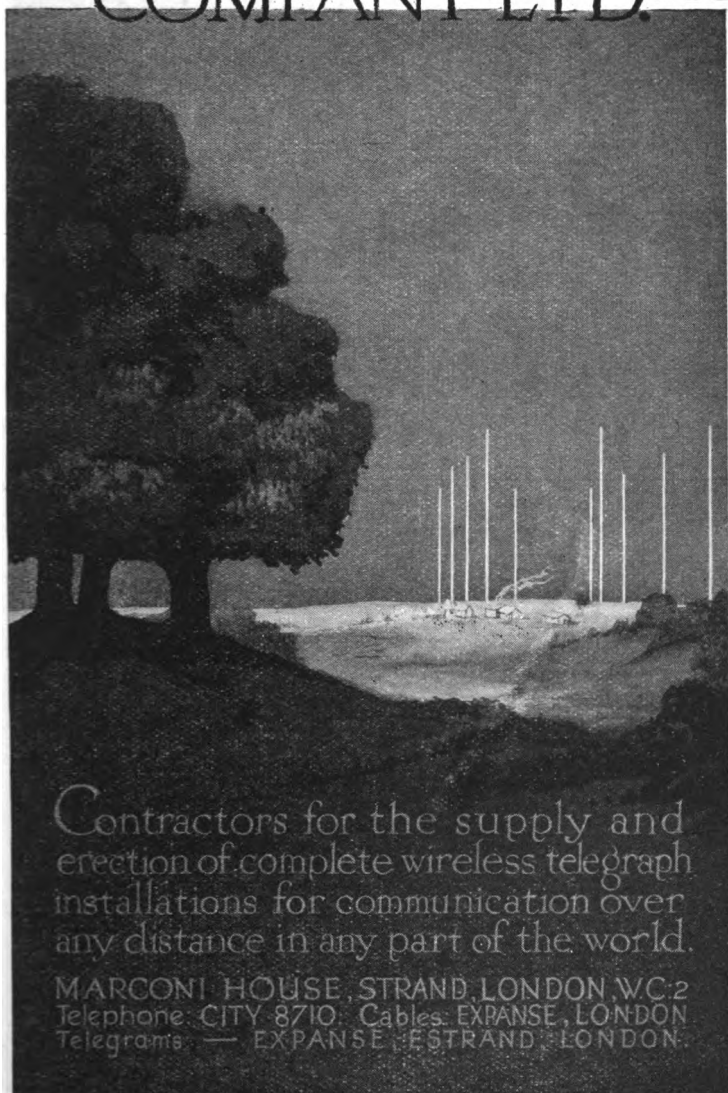
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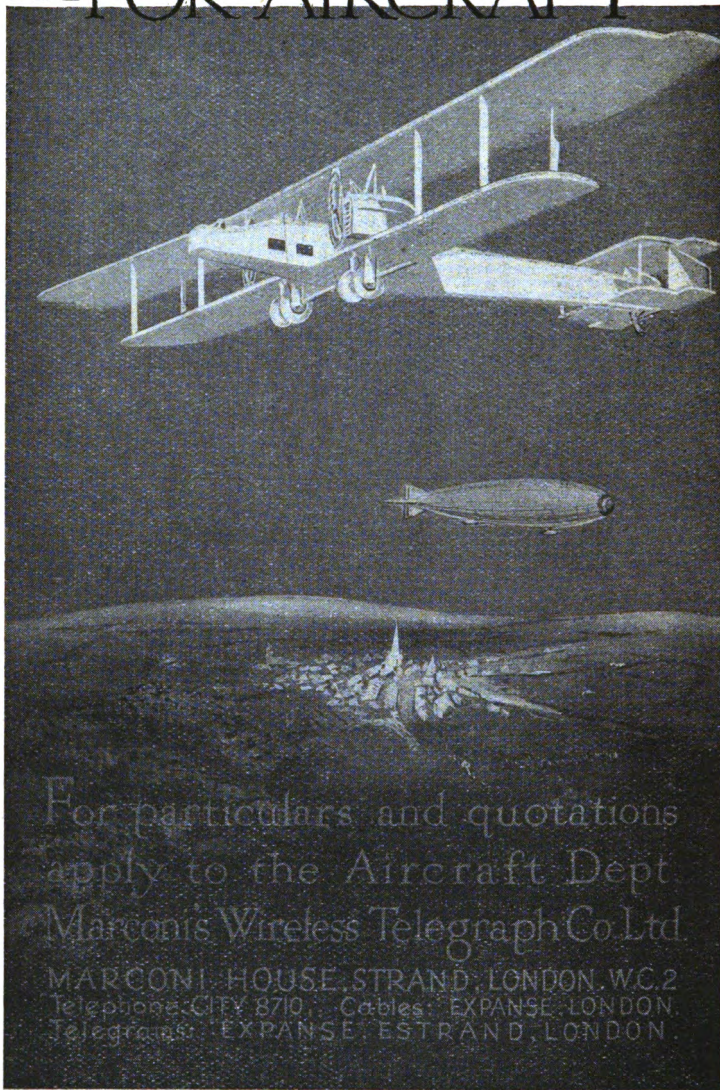
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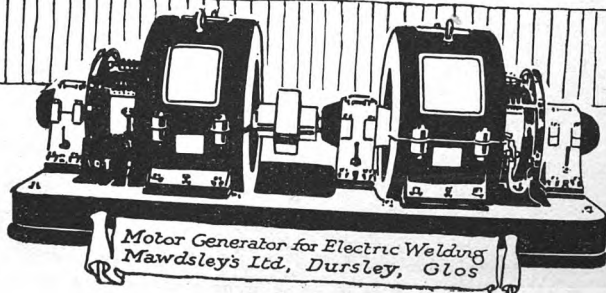
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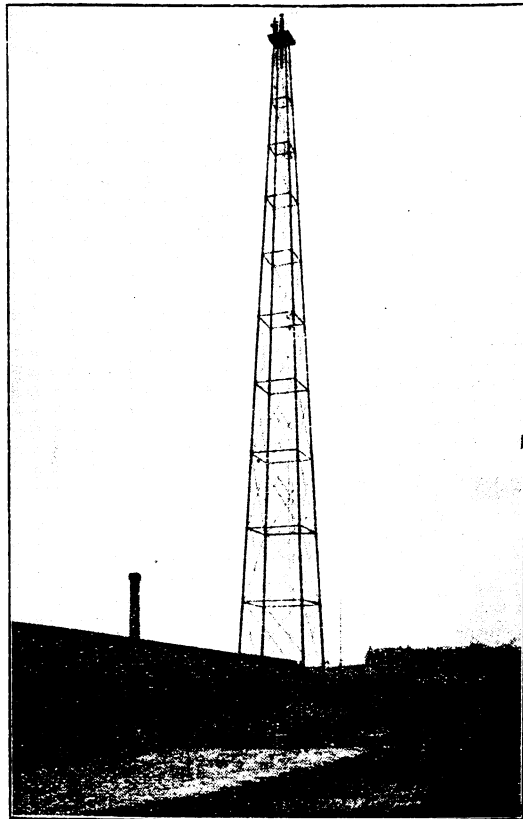
CONTENTS

	PAGE
Index	lvii
Index to Advertisers	lxxvii
Classified Index to Advertisers	lxxix
Preface	lxxxiii
Calendar Section	1-21
Almanack, 1921.. .. .	2
Jewish Calendar	14
Mohammedan Calendar	14
Bank and General Holidays	14
Quarter Days	14
List of Official Holidays in Various Countries of the World	15
Calendar for 1920	21
Calendar for 1922	21
Record of the Development of Wireless Telegraphy	23-44
National and International Wireless Laws and Regulations	45-514
Résumé of Radiotelegraphic Legislation	46
International Radiotelegraphic Convention	48
International Convention on Safety of Life at Sea	64
Wireless Laws and Regulations	79
Directory of the World's Wireless Stations	515-1025
Land Stations	518
Ship Stations	608
International Call Letters	933
Alphabetical List of Call Letters	934

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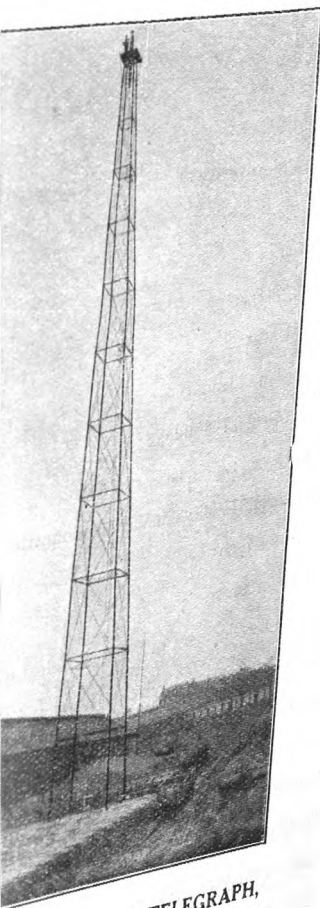
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CONTENTS

Meteorological Section
Radio-Communication and Meteorology. <i>By Lt.-Col. E. G. D.S.O., F.R.S.</i>
Wireless and Time. <i>By Arthur R. Hinks, M.A., F.R.S.</i> ..	..
International Time and Weather Signals .. .. .	..
National Résumés .. .. .	..
Technical Progress of Radiotelegraphy in Canada during 1920 ..	..
Technical Progress of Radiotelegraphy in China during 1920 ..	..
Technical Progress of Radiotelegraphy in France during 1920 ..	..
Technical Progress of Radiotelegraphy in Germany during 1920 ..	..
Technical Progress of Radiotelegraphy in Italy during 1920 ..	..
Technical Progress of Radiotelegraphy in Japan during 1920 ..	..
Technical Progress of Radiotelegraphy in the Netherlands during 1920 ..	..
Technical Progress of Radiotelegraphy in Norway during 1920 ..	..
Technical Progress of Radiotelegraphy in Spain during 1920 ..	..
Technical Progress of Radiotelegraphy and Telephony in United Kingdom during 1920 .. .. .	..
Technical Progress of Radiotelegraphy in the United States during 1920 .. .. .	..
Some Outstanding Problems of Radio Reception-Interference. <i>By P. R. Coursey, B.Sc. F.P.S.L., A.M.I.E.E.</i> .. .. .	..
The Radio Compass. <i>By Stuart Ballantine</i> .. .. .	..
Historical Landmarks in Wireless Invention. <i>By Prof. G. W. O. Howe, D.Sc., M.I.E.E.</i> .. .. .	..
Valve Amplifiers for Shipboard Use. <i>By F. P. Swann</i> .. .. .	..
Patent Section	116
Valve Patents for 1920. <i>By I. Shoenberg</i>
British Patent Specifications, 1920
U.S.A. Patent Specifications, 1920

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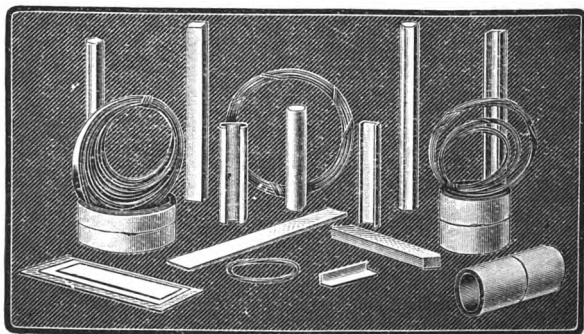
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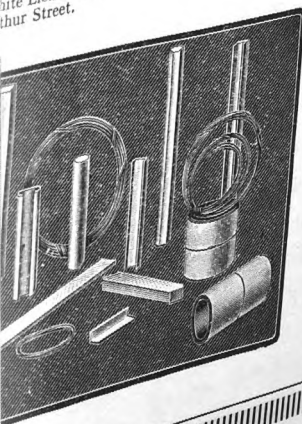
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CONTENTS

Aviation Section	
Wireless Telephony as Applied to Commercial Aviation. <i>Lt.-Col. H. B. T. Childs, A.F.R.Ae.S., A.M.I.E.E.</i> ..	
Tabular List of Aviation Stations	
Aircraft fitted with Wireless Telephony	
Marking of Aircraft	
Table of Marks	
General Information	
Useful Data Section	1
Wireless Terminology	
General Information and Useful Tables	
Conventional Signs used in Wireless Diagrams	
Companies Engaged in the Commercial Development of Wireless Telegraphy	
Biographical Section	12
Biographies	
Obituary Notices	
Literature of Wireless Telegraphy and Telephony	130
New Books published in 1920	
Résumé of Articles published in 1920	
Standard Publications on Wireless	
Amateur Section	132
Amateur Wireless in the United Kingdom. <i>By E. Blake.</i> ..	
Directory of the World's Wireless Societies	
Amateur Call Signs	
Directory of Wireless Colleges and Schools	
Code Section	135
Morse Code	

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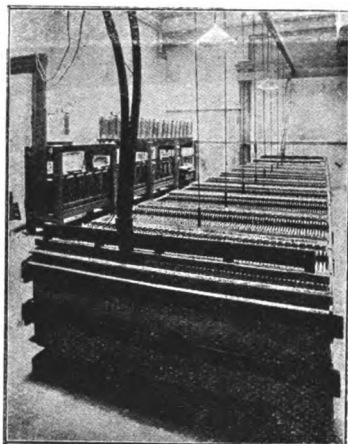
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INDEX

NOTE.—The Land, Ship and Air Stations are not included in
They are grouped together under the countries in which the Land
are erected or to which the ships belong; and in the case of Air
in the Aviation Section.

	PAGE	
Abraham, H.	1274	Articles Published in 1920
Abyssinia—		Asano, Dr. O.
Laws and Regulations ..	79	Ascension Island—
Aden (<i>see</i> British Somaliland)		Laws and Regulations
Admiralty Island	79	Asin, Don H. de
Advertisements, Index to ..	lxxvii	Athanasiadis, Capt. C.
Advertisers, Classified List of ..	lxxix	Atomic and Electronic Data
Aircraft—		Austin, L. W.
Marking of	1209	Australasia—
Table of Marks	1210	Time and Weather Signals
Telephonically Fitted ..	1209	Australelectric Co. (The)
Alaska (<i>see</i> U.S.A.)		Australia—
Alexanderson, E. F. W. ..	1274	Laws and Regulations
Algeria—		Literature of W/T ..
Laws, etc. (<i>see</i> France)		Monetary System ..
Official Holidays	15	Official Holidays ..
Allen, H. W.	1274	Time and Weather Signals
Almanacks—		(<i>see</i> Australasia)
British	2	Austria—
Foreign	14	Laws and Regulations
Amalgamated Wireless (Austra-		Monetary System ..
lasia), Ltd.	1264	Aviation Section ..
Amateur Call Signs	1341	Aviation Stations of the World
Amateur Section	1329	Aviation, Wireless Telephony
American Radio and Research		as applied to Commercial
Corporation	1264	Article on
Angola (<i>see</i> Portuguese West		Azores (<i>see</i> Portugal)
Africa)		
Annam (<i>see</i> France)		Bahamas—
Antigua (<i>see</i> Leeward Islands)		Laws and Regulations ..
Appleby, T.	1274	Bahrein Islands (<i>see</i> Persia)
Appleton, E. V.—		Ballantine, Stuart—
Biography	1274	Biography
Technical Progress of Radio-		Article on "Radio Compass"
telegraphy in United King-		Ballantyne, Hon. C. C. ..
dom	1112	Bangay, R. D.
Arco, Graf G. von	1274	Bank Holidays
Argentina—		Barbadoes—
Laws and Regulations ..	80	Laws and Regulations ..
Literature of W/T	1326	Official Holidays
Monetary System	1255	Basutoland—
Official Holidays	15	Laws and Regulations ..
Time and Weather Signals ..	1052	Beaufort Scale
Armstrong, E. H.	1274	Beggerow, Dr. H.

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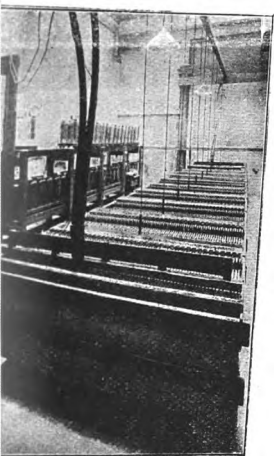
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lviii

INDEX

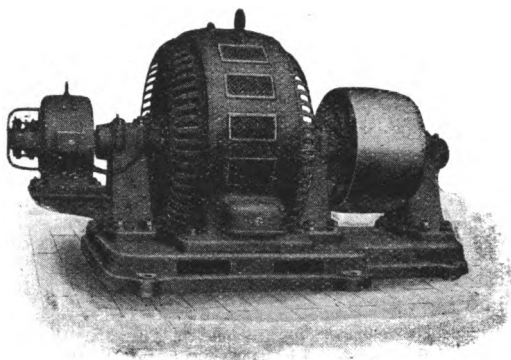
	PAGE
Belgian Congo—	
Laws and Regulations ..	513
Time and Weather Signals ..	1055
Belgium—	
Laws and Regulations ..	119
Literature of W/T ..	1312
Monetary System ..	1256
Official Holidays ..	15
Time and Weather Signals ..	1054
Bellini, Dr. E. ..	1275
Bermudas (The)—	
Laws and Regulations ..	134
Official Holidays ..	15
Bethenod, J. F. J. ..	1275
Bhering, F. ..	1275
Biographical Section ..	1273
Bjarnov, A. W. ..	1276
Bjoerkman, S. O. V. ..	1276
Blake, E.—	
Article on "Amateur Wire-	
less in United Kingdom	1330
Blandy, Col. L. F. ..	1276
Blondel, A. E. ..	1276
Blondlot, Prof. P. R. ..	1276
Bohemia (see Czecho-Slovakia)	
Bolivia—	
Laws and Regulations ..	135
Monetary System ..	1256
Time and Weather Signals ..	1055
Books (New) in 1920 ..	1304
Borneo (British)—	
Laws and Regulations ..	137
Bradfield, W. W. ..	1276
Braillard, R. ..	1276
Branly, E. ..	1276
Brazil—	
Laws and Regulations ..	140
Literature of W/T ..	1313
Monetary System ..	1256
Official Holidays ..	15
Time and Weather Signals ..	1055
Brénot, P. ..	1276
Bright, Sir Chas. ..	1277
British East Africa (see Kenya-	
land Colony)	
British Guiana—	
Laws and Regulations ..	155
Official Holidays ..	15
British Honduras—	
Laws and Regulations ..	156
Monetary System ..	1256
Time and Weather Signals ..	1055
British North Borneo	
British Somaliland—	
Laws and Regulations	
Brown, F. J. ..	
Brown, S. G. ..	
Bucher, E. E. ..	
Bulgaria—	
Laws and Regulations	
Monetary System ..	
Time and Weather Signal	
Bullard, Rear-Admiral W.H.	
Burma (see India)	
Burstyn, Dr. W. ..	
Calendar, 1920 and 1922	
Calendar, 1921 ..	
Calendar Section ..	
Calendars, Various ..	
Call Letters (Alphabetical)	
Call Letters (Amateur)	
Call Letters (International)	
Canada—	
Canadian Marconi Company	
Laws and Regulations	
Monetary System ..	
Official Holidays ..	
Technical Progress of Radio	
telegraphy in ..	
Time and Weather Signals ..	
Canary Islands—	
Laws and Regulations	
Time and Weather Signals.	
Carpentier, J.	
Castañon, Lieut.-Col. Don. L.	
Ceylon—	
Laws and Regulations	
Chaffee, Prof. E. L. ..	
Chamberlain, E. T. ..	
Chart of Wireless Commercial	
Services ..	
Chatham Islands (see New	
Zealand)	
Chevrelière, Baron de la ..	
Childs, H. B. T.—	
Biography ..	
Article on "Wireless Tele-	
phony as applied to	
Commercial Aviation" ..	
Chile—	
Laws and Regulations	
Monetary System ..	
Official Holidays ..	
Time and Weather Signals ..	

lix

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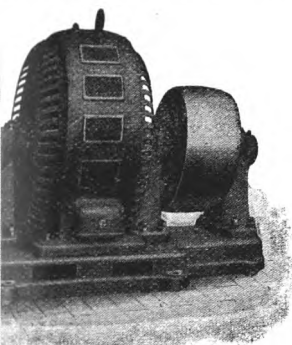
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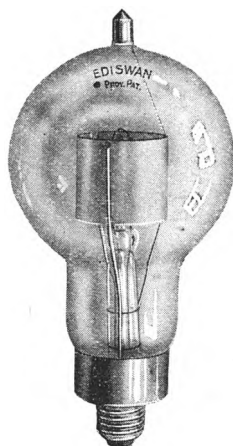
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INDEX

	PAGE
China—	
Laws and Regulations ..	196
Monetary System ..	1256
Technical Progress of Radio- telegraphy in ..	1096
Time and Weather Signals ..	1057
Chinese National W.T. Co. ..	1265
Chree, Dr. C. ..	1278
Cochin-China—	
Laws, etc. (see France)	
Monetary System ..	1256
Official Holidays ..	16
Cocos - Keeling Islands (see Straits Settlements)	
Code Section ..	1351
Cohen, L. ..	1278
Colombia—	
Laws and Regulations ..	207
Monetary System ..	1256
Official Holidays ..	16
Comoro Islands ..	208
Compagnie d'Exploitation Radio-Electrique ..	1265
Compagnie Générale de Télé- graphie sans Fil ..	1265
Companhia Radiotelegrafica Brasileira ..	1265
Compañía Marconi de Tele- grafía sin Hilos del Rio de la Plata ..	1265
Compañía Nacional de Tele- grafía sin Hilos ..	1266
Companies, Particulars of, En- gaged in Development of Wireless Telegraphy ..	1264
Congo, Belgian—	
Laws and Regulations ..	513
Time and Weather Signals ..	1055
Conventional Signs used in Wireless Diagrams ..	1261
Cook Islands ..	208
Corea (see Japan)	
Costa Rica—	
Laws and Regulations ..	209
Official Holidays ..	16
Coursey, Philip R.—	
Biography ..	1278
"Some Problems of Radio Reception—Interference" ..	1121
Craioveanu, E. ..	1279
Crawley, Lieut.-Col. C. G. ..	1279
Cresswell, F. G. ..	1279
Crete—	
Laws and Regulation ..	
Cross, Prof. C. R. ..	
Cuba—	
Laws and Regulations ..	
Official Holidays ..	
Time and Weather Sig ..	
Curaçao (see Netherlands)	
Cyprus—	
Laws and Regulations ..	
Czecho-Slovakia—	
Laws and Regulations ..	
Time and Weather Signa ..	
Data, Useful ..	
De Forest, Dr. L. ..	
De Groot, Dr. Eng. C. J. ..	
Demerara (see British Gui ..	
Denmark—	
Laws and Regulations ..	
Literature of W/T ..	
Monetary System ..	
Official Holidays ..	
Time and Weather Signals ..	
Desbarats, G. J. ..	
Destrüge, G. ..	
De Valbreuze, R. ..	
De Vasconcellos e Sa, Dr. A. ..	
Development of Wireless Te ..	
graphy, Record of ..	
Directory of Wireless School ..	
Directory of Wireless Societi ..	
Dominica (see Leeward Island ..	
Dominican Republic—	
Laws and Regulations ..	
Drahtloser Uebersee - Verkeh ..	
A.G. (Transradio) ..	
Dubilier, W. ..	
Dutch East Indies (see Nether ..	
lands)	
East African Protectorate (see Kenyaland Colony)	
Eccles, W. H. ..	
Ecuador—	
Laws and Regulations ..	
Official Holidays ..	
Egypt—	
Laws and Regulations ..	
Official Holidays ..	
Monetary System ..	

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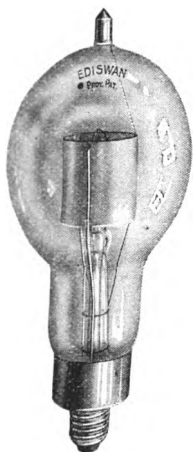
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INDEX

	PAGE
Eichhorn, G. ..	1280
Eisenstein, S. M. ..	1280
Erskine-Murray, J. ..	1281
Erythrea—	
Laws, etc. (see Italy)	
Monetary System ..	1256
Estonia—	
Official Holidays ..	16
Time and Weather Signals..	1059
Eve, Prof. A. S., on Technical	
Progress of Wireless in	
Canada ..	1094
Ewen, H. A. ..	1281

Falkland Islands—

Laws and Regulations ..	223
Time and Weather Signals..	
Farøe Islands (see Denmark)	
Farrand, C. L. ..	1281
Federal Telegraph Co. ..	1266
Ferrié, Gen. G. ..	1281
Fessenden, R. A. ..	1281
Field, Rear-Admiral F. L. ..	1281

Fiji Islands—

Laws and Regulations ..	224
Finland—	
Laws and Regulations ..	227
Official Holidays ..	16

Fisk, E. T. ..	1281
Fleming, Dr. J. A. ..	1282
Forberg, O. E. ..	1282
Formosa (see Japan)	
Fortescue, Cecil L. ..	1282

France—

Laws and Regulations ..	227
Literature of W/T ..	1313
Monetary System ..	1257
Official Holidays ..	16
Technical Progress of Radio-	
telegraphy in ..	1097
Time and Weather Signals ..	1060

Franklin, C. S. ..

French Colonies—	
Laws and Regulations ..	237
French Oceania—	
Time and Weather Signals..	1066

Frey, E. ..

Friendly Islands (see Tonga	
Islands under Pacific Islands)	
Frouin, M. ..	1282

Gambia—

Laws and Regulations ..	
General Holidays ..	
Gentil, Capt. A. A. S. ..	
Georgia—	
Laws and Regulations ..	
Germany—	
Aerial Information ..	
Laws and Regulations ..	
Literature of W/T ..	
Monetary System ..	
Official Holidays ..	
Technical Progress of I	
telegraphy in ..	
Time and Weather Signa	
Gesellschaft für drahtlose	
graphie m.b.h. (Telefun	

Gibraltar—

Laws and Regulations ..	
Time and Weather Signa	
Gilbert and Ellice Islands—	
Laws and Regulations ..	
Girardeau, E. ..	
Glazebrook, Sir R. T. ..	
Gold Coast Colony—	
Laws and Regulations ..	
Gold, Lt.-Col. E.—	
Biography ..	
Article on "Radio-C	
munication and Met	
ology" ..	

Goldschmidt, Prof. Dr. R. ..	
Goldsmith, Prof. A. N.—	
Biography ..	
"Technical Progress of Ra	
Communication in U.S.A.	

Gottwaldt, Commdr. B. L.—	
Biography ..	
"Technical Progress of Wi	
less in Norway ..	

Gray, A. ..	
-------------	--

Great Britain (see U.K.)	
--------------------------	--

Greece—

Laws and Regulations ..	
Literature of W/T ..	
Monetary System ..	
Official Holidays ..	
Time and Weather Signals.	

Grenada—

Laws and Regulations ..	
-------------------------	--

Grenfell, Wing-Commr. G. F. ..	
--------------------------------	--

Guam ..

Guatemala—	
Laws and Regulations ..	
Official Holidays ..	

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INDEX

	PAGE
Haiti—	
Laws and Regulations ..	260
Official Holidays ..	17
Hammond, J. H., jun. ..	1284
Harrison, Lt.-Col. N. ..	1284
Hawaii—	
Laws, etc. (see U.S.A.)	
Time and Weather Signals ..	1067
Hayashi, Prof. F. ..	1284
Hinks, Arthur R.—	
Article on "Wireless and Time" ..	1040
"Historical Landmarks in Wireless Invention." Article on ..	1148
Hogan, J. V. L. ..	1284
Holidays, Official ..	15
do. Bank and General ..	14
Holland (see Netherlands)	
Holmstroem, J. G. ..	1284
Honduras (British)—	
Laws and Regulations ..	156
Monetary System ..	1256
Official Holidays ..	17
Honduras (Republic of)—	
Laws and Regulations ..	260
Official Holidays ..	17
Hong-Kong—	
Laws and Regulations ..	196
Official Holidays ..	16
Time and Weather Signals ..	1068
Hooper, Commdr. S. C. ..	1284
Hope-Jones, F. ..	1284
Howe, Prof. G. W. O.—	
Biography ..	1284
Article on "Historical Landmarks in Wireless Invention" ..	1148
Hoyle, Lieut. B. ..	1285
Hungary—	
Laws and Regulations ..	261
Monetary System ..	1255
Iceland—	
Laws and Regulations ..	169
Literature of W/T. ..	1327
Illingworth, A. H. ..	1285
Independent Wireless Telegraph Co. Inc. ..	1267
Index to Valve Patents—	
British ..	1190
U.S.A. ..	1194
India—	
Laws and Regulations ..	
Monetary System ..	
Official Holidays ..	
Time and Weather Signals ..	
International Convention ..	
Safety of Life at Sea ..	
International Radiotelegraph Convention, 1912 ..	
International Rules for Synchronisation ..	
International Time ..	
Weather Signals ..	
International Wireless ..	
and Regulations ..	
Isaacs, Godfrey C. ..	
Italian Somaliland—	
Laws, etc. (see Italy)	
Monetary System ..	
Italy—	
Laws and Regulations ..	
Literature of W/T. ..	
Monetary System ..	
Official Holidays ..	
Technical Progress of Radiotelegraphy in ..	
Time and Weather Signals ..	
Jackson, Admiral Sir H. B.	
Jamaica—	
Laws and Regulations ..	
Official Holidays ..	
Janet, P. ..	
Japan—	
Laws and Regulations ..	
Literature of W/T. ..	
Monetary System ..	
Official Holdings ..	
Technical Progress of Radiotelegraphy in ..	
Time and Weather Signals ..	
Jenner, A. ..	
Jewish Calendar ..	
Jotikasatira Hang ..	
Jugo-Slavia—	
Laws and Regulations ..	
Monetary System ..	
Time and Weather Signals ..	
Kadöka, Hayao	
Kajima, A.	
Kennedy, Sir A. B. W.	
Kennelly, A. E.	
Kenyaland Colony—	
Laws and Regulations ..	
Kift, A. A.	
Kimura, Shunkichi	

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INDEX

	PAGE		PAGE
King, Prof. L. V.	1286	Malaya—	
Kojima, Chief Engr. Kiyoshi ..	1286	Laws and Regulations	
Kolster, F. A.	1286	Monetary System (<i>see</i> St	
Koomans, N.	1286	Settlements)	
Korea (<i>see</i> Japan)		Malgat, Capt. E. ..	
Korn, Prof. A.	1287	Malta—	
Koto, Maj.-Gen. T.	1287	Laws and Regulations	
Krurup, J. F.	1287	Time and Weather Signal	
Kroger, F. H.	1287	Manus	
Kujirai, T.	1287	Marchant, E. W. ..	
Kwantung (<i>see</i> Japan)		Marchant, W. H. ..	
		Marconi, A.	
		Marconi, Senatore G.	
Land Stations of the World ..	518	Marconi International Mar	
Ladron Islands		Communication Co., Ltd.	
Langmuir, Dr. J.	310	Marconi Scientific Instrume	
Latour, M.—	1287	Co., Ltd.	
Biography	1287	"Marconi" Societate Anonim	
"Technical Progress of Radio-		Romana Pentru Industria	
telegraphy in France" ..	1097	Comertul de Materiala	
Latvia—		Telegrafice Telefonice	
Laws and Regulations		Marconi Wireless Telegraph C	
Official Holidays	310	of Canada, Ltd.	
Laws and Regulations—	17	Marconi's Wireless Telegraph	
National and International..	46	Co., Ltd.	
Wireless	79	Marianne Islands	
Leeward Islands—		Marriott, R. H. ..	
Laws and Regulations	310	Marshall Islands	
Legislation, Résumé of Radio-		Martinique (<i>see</i> France)	
telegraphic	46	Marvá, Gen. J. ..	
Liberia—		Mauritius—	
Laws and Regulations		Laws and Regulations	
Official Holidays	313	Time and Weather Signals ..	
Libya—	17	McLachlan, N. W. ..	
Monetary System	1257	McMichael, H. L. ..	
Lippmann, G.	1287	Measures of Time	
Literature of W/T.	1303	Meissner, Dr. Eng. A.—	
Litström, A. S.	1288	Biography	
Ljungqvist, S.	1288	"Technical Progress of Radio-	
Lodge, Sir O.	1288	telegraphy in Germany" ..	
Lombardi, Dr. L.	1288	Meteorological Section	
Loring, Commander F. G. ..	1288	" Meteorology, Radio Com-	
Luxembourg—		munication and "": Article	
Laws and Regulations		by Lieut.-Col. E. Gold, D.S.O.	
Lyons, Col. H. G.	314	Metric System	
	1288	Mexico—	
		Laws and Regulations	
		Monetary System	
		Official Holidays	
		Time and Weather Signals ..	
		Meyer, N.	
		Mile Equivalents	
		Minohara, Lieut.-Col. Dr. T. ..	
		Mohammedan Calendar	
Machado, A. de M. ..	1288		
Madagascar (<i>see</i> France)			
Makower, A. J.	1288		
Makower, Capt. W.	1288		

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River Plate to Scandinavian Ports

son Bay Co., London.
asapeake & Ohio Coal
oke Co. Ltd., New York.

INDEX

	PAGE
Monckton, C. C. F. ..	1290
Montefinale, Com. G.—	
Biography ..	1290
"Technical Progress of Wire- less in Italy" ..	1102
Montserrat (<i>see</i> Leeward Islands)	
Moreno Quesada, D. Manuel ..	1291
Morocco—	
Laws and Regulations ..	322
Official Holidays ..	17
Morse Code ..	1351
Muirhead, Dr. A. ..	1302
Mullard, S. R. ..	1291
Nally, E. J. ..	1291
National and International Wireless Laws and Regula- tions ..	46
National Résumés ..	1094
Nautical Measures ..	1250
Navarro y Ortiz, D. Benito ..	1291
Nederlandsche Seintoestellen Fabriek ..	1269
Nederlandsche Telegraaf Maat- schappij, Radio Holland ..	1269
Netherlands—	
Laws and Regulations ..	325
Literature of W/T... ..	1321
Monetary System ..	1257
Official Holidays ..	17
Technical Progress of Radio- telegraphy in ..	1107
Time and Weather Signals ..	1073
New Caledonia (<i>see</i> France)	
Newfoundland—	
Laws and Regulations ..	332
Time and Weather Signals ..	1056
New Guinea ..	338
New Hebrides—	
Laws and Regulations ..	358
New Zealand—	
Laws and Regulations ..	338
Literature of W/T. ..	1327
Official Holidays ..	17
Time and Weather Signals ..	1053
Nicaragua—	
Laws and Regulations ..	347
Official Holidays ..	18
Nigeria—	
Laws and Regulations ..	347
Nicholls, Lt.-Col. Hon. F. ..	1291
Nierstrasz, H. J. ..	1302
Noble, Sir Wm. ..	1291
Norman, Major the Rt. ..	
Sir Henry ..	
Norsk Marconikompani A.S.	
Northern Rhodesia—	
Laws and Regulations ..	
Norway—	
Laws and Regulations ..	
Literature of W/T. ..	
Monetary System ..	
Official Holidays ..	
Technical Progress of Ra- diotelegraphy in ..	
Time and Weather Signals ..	
Nyasaland Protectorate—	
Laws and Regulations ..	
Obituary ..	
Oceania (French)—	
Time and Weather Signals ..	
Official Holidays ..	
Orme, Maj. Robert ..	
Pacific Islands—	
Laws and Regulations ..	
Panama (Canal Zone)—	
Laws and Regulations ..	
Official Holidays ..	
Time and Weather Signals ..	
Panama (Republic)—	
Laws, etc. (<i>see</i> Panama Canal Zone)	
Official Holidays ..	
Pan-American Wireless Tele- graph and Telephone Co. ..	
Pannill, C. J. ..	
Paraguay—	
Laws and Regulations ..	
Official Holidays ..	
Parker, J. N. ..	
Patent Section ..	
Patent Specifications, British..	
Patent Specifications, U.S.A. ..	
Patents, Valve, for 1920 Index—	
British ..	
U.S.A. ..	
Pedersen, P. O. ..	
Pemba (<i>see</i> Zanzibar)	
Penido, A. N. ..	
Perim ..	
Persia—	
Laws and Regulations ..	
Peru—	
Laws and Regulations ..	
Official Holidays ..	
Petavel, Sir Joseph E. ..	
Petersen, Hermod ..	

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INDEX

	PAGE
Petit, G. E.	1293
Philippine Islands—	
Laws and Regulations	372
Time and Weather Signals	1075
Pickard, G. W.	1293
Pletts, J. St. V.	1293
Poland—	
Laws and Regulations	374
Time and Weather Signals	1076
Porto Rico (see Puerto Rico)	
Portugal—	
Laws and Regulations	375
Literature of W/T.	1323
Monetary System	1257
Official Holidays	18
Portuguese East Africa	
Laws, etc. (see Portugal)	
Time and Weather Signals	1076
Portuguese Guinea—	
Laws and Regulations	380
Portuguese West Africa—	
Laws and Regulations	381
Poulsen, V.	1293
Preface	lxxxiii
Prince, Maj. C. E.	1293
"Problems of Radio Reception—	
Interference	1121
Publications (Standard)	1312
Puerto Rico—	
Laws and Regulations	382
Official Holidays	18
Time and Weather Signals	1076
Pupin, Dr. M. L.	1293
Quarter Days	14
Radio-Communication and	
Meteorology	1028
Radio-Communication Co., Ltd.	1270
"Radio Compass." Article by	
Stuart Ballantine	1131
Radio Corporation of America	1270
Radiotelegraphic Convention,	
International	48
Radiotelegraphic Legislation,	
Résumé of	46
Radiotelegraphy and Safety of	
Life at Sea	64
Ramsing, Lieut.-Col. H. U.	1293
Record of Development of Wire-	
less Telegraphy	24
Regulations, National and In-	
ternational Wireless	46
Regulations, Wireless Laws and	
Rego, Capt. T. R. M.	79
Rendahl, R. H.	1294
Reoch, A.	1294
Rhodesia—	
Laws and Regulations	383
Ribeiro, A. N.	
Righi, Prof. A.	
Rinde, K. W. J.	
R. M. Radio, Ltd.	
Robinson, F. E., on "Techr	
Progress of Wireless in Chi	
Robinson, J.	
Robison, S. S.	
Rodrigues, A. G. da S.	
Roumania—	
Laws and Regulations	
Monetary System	
Official Holidays	
Time and Weather Signals	
Russia—	
Laws and Regulations	
Monetary System	
Official Holidays	
Russian Company of Wirele	
Telegraphs and Telephones	
Rydin, S. L. H.	
Safety of Life at Sea, Inter	
national Convention	
Saint Helena—	
Laws and Regulations	
Saint Kitts-Nevis (see Leeward	
Islands)	
Saint Lucia—	
Laws and Regulations	
Saint Vincent (B.W.I.)—	
Laws and Regulations	
Salmond, Capt. J. S. C.	
Saltzman, C. M.	
Salvador, El—	
Laws and Regulations	
Official Holidays	
Samoa Islands—	
Laws and Regulations	
Time and Weather Signals	
Sandwich Islands (see United	
States of America)	
San Francisco	
Sankey, Capt. M. P. H. Riall	
Santo Domingo (Dominican	
Republic)—	
Laws and Regulations	
Official Holidays	
Sarawak—	
Laws and Regulations	
Sarnoff, D.	
Sayeki, M.	
Schledermann, H. J. C.	
Schwill, F.	
Sea, Safety of Life at, Inter	
national Convention on	
Servia (see Jugo-Slavia)	
Seychelles Islands—	
Laws and Regulations	3

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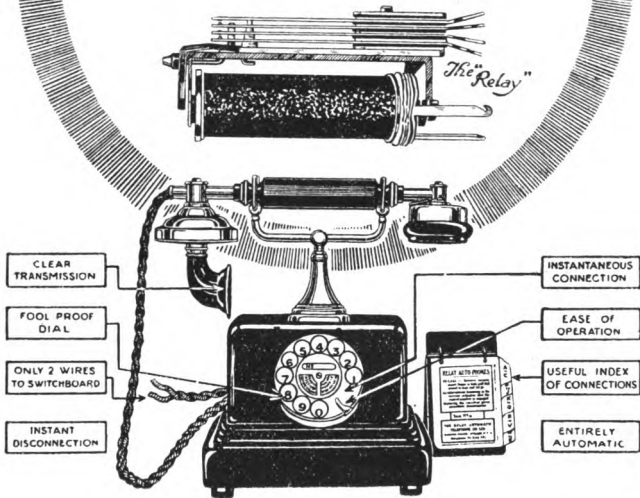
INDEX

	PAGE
Shanghai—	
Official Holidays	16
Shaughnessy, E. H.	1295
Ship Stations of the World ..	608
Shoenberg, I., on "Valve Patents for 1920"	1168
Siam—	
Laws and Regulations	401
Official Holidays	18
Siberia	407
Sierra Leone—	
Laws and Regulations	408
Signs, Conventional	1261
Simpson, Lt.-Col. A.	1296
Sins, E.	1296
Slee, Commdr. J. A.	1296
Smith-Rose, R. L.	1296
Snell, Sir J. F. C.	1296
Société Anonyme Internationale de Télégraphie sans Fil ..	1271
Société Française Radio- Electrique	1271
Société Indépendante Belge de Télégraphie sans Fil, Société Anonyme	1271
Schools, Directory of Wireless ..	1342
Societies, Directory of Wireless ..	1333
Solari, Marquis L.	1297
Solomon Islands	410
South Africa, Union of—	
Laws and Regulations	410
Official Holidays	19
Time and Weather Signals ..	1076
Southern Rhodesia—	
Laws and Regulations	383
Spain—	
Laws and Regulations	413
Literature of W/T.	1323
Monetary System	1257
Official Holidays	19
Technical Progress of Radio- telegraphy in	1110
Time and Weather Signals ..	1077
Spanish and General Corpora- tion, Ltd. The	1271
Special Articles Section	1093
Spitzbergen—	
Laws and Regulations	427
Squier, Maj.-Gen. Sir Geo. O. ..	1297
Stanley, R.	1297
Stone Stone, J.	1297
Straits Settlements—	
Laws and Regulations	428
Official Holidays	19
Monetary System	1257
Sudan—	
Laws and Regulations	430
Swann, F. P., Article on "Valve Amplifiers for Ship- board Use	1158
Sweden—	
Laws and Regulations	
Literature of W/T.	
Monetary System	
Official Holidays	
Time and Weather Sign ..	
Swinburne, J.	
Swinton, A. A. C.	
Switzerland—	
Laws and Regulations	
Literature of W/T.	
Tafur, Col. D. José	
Tahiti (see France)	
Tasmania—	
Laws, etc. (see Australia)	
Official Holidays	
Terminology, Wireless	
Tesla, N.	
Thoenblad, T.	
Time and Weather Sign ..	
International	
"Time, Wireless and." Arti ..	
by A. R. Hinks, M.A. ..	
Todd, D. W.	
Tonga Islands—	
Laws and Regulations	
Tonquin (see France)	
Torikata, Dr. Wichi	
Travailleur, M.	
Trinidad—	
Official Holidays	
Trinidad and Tobago—	
Laws and Regulations	
Tripoli—	
Laws, etc. (see Italy)	
Official Holidays	
Tsiang Tseng-yi	
Tunis (see France)	
Turkey—	
Laws and Regulations	
Monetary System	
Official Holidays	
Time and Weather Signals ..	
Turk's Island—	
Official Holidays	
Turner, L. B.	
Turner, S.	
Turpain, Prof. A.	
Uganda—	
Laws and Regulations	
Union of South Africa (see ..	
South Africa, Union of)	

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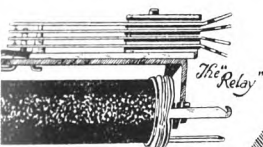


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INDEX

PAGE

United Kingdom—	
Laws and Regulations	442
Literature of W/T.	1316
Patents	1187
Technical Progress of Radio- telegraphy in	1112
Time and Weather Signals	1080
Wireless Schools	1344
Wireless Societies	1334
Uruguay—	
Laws and Regulations	507
Monetary System	1258
Official Holidays	20
Time and Weather Signals	1091
U.S.A.—	
Aerial Information	1210
Laws and Regulations	475
Literature of W/T.	1324
Monetary System	1258
Official Holidays	19
Patents	1191
Technical Progress of Radio- telegraphy in	1115
Time and Weather Signals	1083
Wireless Schools	1342
Wireless Societies	1337
Useful Data Section	1215
Vallauri, G.	1299
"Valve Amplifiers for Ship- board Use." Article by F. P. Swann	1158
Valve Nomenclature	1258
Valve Patents for 1920	1168
Van der Bijl, Dr. H. J.	1299
Van der Pol, Balth, jun.— Biography	1299
"Technical Progress of Radio- telegraphy in Netherlands"	1107
Vanni, Dr. G.	1299
Venezuela—	
Laws and Regulations	509
Monetary System	1258
Official Holidays	20
Virgin Islands (see Leeward Islands)	
Vyvyan, R. N.	1299
Wade, C. F. Newton	
Walter, L. H.	
Weagant, R. A.	
Weather Signals, Internati	
Weights and Measures	
Weihaiwei— Laws and Regulations	
Whiddington, R.	
Whitmore, G. S.	
Wibier, Major Albert	
Wien, Prof. M.	
Wilson, Brig.-Gen. S. H.	
"Wireless and Time." Arti	
by A. R. Hinks	
Wireless Commercial Service	
Chart of	
"Wireless Invention, Historic	
Landmarks in." Article b	
Prof. G. W. O. Howe, D.S.	
Wireless Laws and Regulation	
Wireless Laws and Regulation	
National and Internationa	
Wireless Schools, Directory o	
Wireless Societies, Directory o	
Wireless Speciality Apparatus	
Co.	
Wireless Telegraph Stations o	
the World	
"Wireless Telephony as App	
plied to Commercial Avia	
tion." Article by Lt.-Col.	
H. B. T. Childs	
Wireless Terminology	
Yagi, Prof. H.	
Yokoyama, E.—	
Biography	
"Technical Progress of Wire	
less in Japan"	
Yugo-Slavia (see Jugo-Slavia)	
Zanzibar—	
Laws and Regulations	
Zenneck, Prof. Dr. J.	

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of the Royal Italian Treasury and
 ational Institute for Foreign Exchange.

NG & EXCHANGE BUSINESS transacted.

lxxvi

INDEX TO ADVERTISERS

	PAGE	
Aberdeen Line, The ..	cx	Dougall & Stirrat ..
'All's Well' Oil Co., Ltd. . .	vi	Dubilier Condenser Co., Ltd.
Amalgamated Wireless (Aus- tralasia), Ltd. . .	lxxii	Eden Fisher & Co., Ltd. .
American Hard Rubber Co. (Britain), Ltd. . .	xvi	Edison Swan Electric Co. Ltd., The ..
Anglo-American Oil Co., Ltd.	cx	Elder Dempster & Co., Ltd.
Ansaldo San Giorgio ..	xv	Electric Construction Co. Ltd., The ..
Associated Marconi Com- panies Representatives & Agents, Offices of. . .	xlvi	Electrical Press, Ltd.
Babcock & Wilcox, Ltd. . .	xvi	Ellerman's Wilson Line, Ltd.
Banca Italiana di Sconto ..	lxxvi	"Engineer, The" ..
Berk, F. W., & Co., Ltd. . .	lviii	Ercole Marelli & Co., Ltd.
Bibby Bros. & Co. (Bibby Line) ..	cvii	Federal Steam Navigation Co. Ltd. . .
Britannia Rubber and Kamp- tulicon Co., Ltd. . .	lxvi	"Geographia," Ltd. . .
Brown, S. G., Ltd. . .	xxxii	Graham & Latham, Ltd. . .
Bullivant & Co., Ltd. . .	lvi	Harveys' ..
Burnham & Co. . .	lxxxv	Henley's, W. T., Telegraph Works Co., Ltd. . .
Cayzer, Irvine & Co., Ltd. (Clan Line) ..	cv	Holland-America Line ..
Chadwick, Joseph, & Sons. .	c	Hood & Bodies, Ltd. . .
Chadwick, Weir & Co., Ltd.	lxviii	Humber Wood Wool Fibre Mills Co., Ltd. . .
Chandler, Lindsay & Co. . .	ciii	Isenthal & Co., Ltd. . .
Commercial Union Assurance Co., Ltd. . .	lxxxvii	Johnson & Phillips, Ltd. . .
Commonwealth & Dominion Line, Ltd. . .	cvii	"Journal of Commerce, The"
Compañia Nacional de Tele- grafia sin Hilos ..	xxxiii	Kartret Engineering Co., Ltd.
Coubro & Scrutton, Ltd. . .	xxxviii	The ..
Creed & Co., Ltd. . .	xxxi	Koninklijke Paketvaart Maatschappij ..
Crompton & Co., Ltd. . .	xxviii	
D.P. Battery Co., Ltd., The	lviii	
Dominion College of Radio- Telegraphy, Ltd., The ..	x	

INDEX TO ADVERTISERS

	PAGE		PAGE
L.P.S. Electrical Co., The ..	xxiv	Officine Elettro-Meccaniche Società Anonima	iv
Lampert & Holt, Ltd. ..	cx	Ormiston, P., & Sons ..	viii
Lloyd Sabaudo ..	lxxxviii		
Lloyd Triestino Società' di Navigazione a Vapore ..	ci	Paisleys Ltd.	xiii
Locket & Judkins	xciv	Pinchin, Johnson & Co., Ltd.	xlvi
London Electric Wire Co. & Smiths Ltd., The	v	Pirelli Ltd.	xxxv
		Potter, J. D.	xxiv
		Prince Line, Ltd.	cviii
		Pritchett & Gold and Elec- trical Power Storage Co., Ltd.	xxvi
McCorquodale & Co., Ltd. . .	ciii		
McGeoch, William, & Co., Ltd.	xviii	R.M. Radio, Ltd.	xviii
McGraw-Hill Publishing Co. Ltd.	xcix	Radio Corporation of America	xix
McGruer Hollow Spar Co., Ltd.	xxxvii	"Relay" Automatic Tele- phone System, The ..	lxxiv
Mackie, W., & Co.	lxiv	Rotterdam Lloyd Royal Mail Line	cv
Marconi International Code Co., Ltd., The	xvii		
Marconi International Marine Communication Co., Ltd.	lxxxix	Sanders Phillips & Co., Ltd.	xxii
Marconi International Marine Communication Co., Ltd. —Depôts and Inspecting Stations	xc, xci, xcii	Self & Son	vi
Marconi Schools of Radiotele- graphy, The	x	Simmonds Bros., Ltd. ..	xxx
Marconi Scientific Instrument Co., Ltd., The	xxxix	Società Anonima Balzarini ..	xli
Marconi's Wireless Telegraph Co., Ltd. .. xliii, xliv, xlv and Back Cover		Società Anonima Giovanni Hensemberger	xxxiv
		Società Nazionale di Navi- gazione	ci
		Spicer Brothers, Ltd. ..	xciv
Marconi Wireless Telegraph Co. of Canada, Ltd., The	xxxvi	Sterling Telephone & Electric Co., Ltd.	vii
Miller, Rayner & Haysom, Ltd.	xi	Steven, A. & P.	viii
Milliken & Brothers Manufac- turing Co., Inc.	xxvii	Stewarts & Lloyds, Ltd. ..	lii
Mitchell's Electrical & Wire- less, Ltd.	xx	Sullivan, H. W.	l
Mullard Radio Valve Co., Ltd.	xxix	"Syren & Shipping" ..	xiv
Navigazione Generale Italiana-Lloyd ..	cix	Telford, Grier & Mackay Ltd.	xlii
New Zealand Shipping Co., Ltd.	cii	Tingey	xlviii
North British & Mercantile Insurance Co., The ..	xciii	Tudor Accumulators ..	xii
		Vickers Ltd.	liv
		Whitecross Co., Ltd., The ..	xii
		Wireless Press, Ltd., The lxxxviii, xcvi, xcvi, ciii, cx	
		"Wireless World, The" ..	civ

CLASSIFIED INDEX TO ADVERTISERS

	PAGE		PAGE
Accumulator and Battery Manufacturers :		Coal and Timber Merchants :	
D. B. Battery Co., Ltd., The	lviii	Locket & Judkins ...	xciv
Pritchett & Gold and Elec- trical Power Storage Co. The	xxvi	Condensers :	
Societa Anonima Giovanni Hensemberger	xxxiv	Dubilier Condenser Co., Ltd.	xxi
Tudor Accumulators ...	xii	Iseenthal & Co., Ltd. ...	xxiii
		Marconi Scientific Instru- ment Co., Ltd., The ...	xxxix
Banking and Insurance Com- panies :		Electrical Apparatus, etc. :—	
Banca Italiana di Sconto	lxxvi	Societa Anonima Balzarini	xli
Commercial Union Assur- ance Co., Ltd.	lxxxvii	Spicer Brothers, Ltd. ...	xciv
North British and Mercan- tile Insurance Co. ...	xciii	Electrical Engineers and Con- tractors :	
Boiler Makers :		Creed & Co., Ltd.	xxxi
Babcock & Wilcox, Ltd. ...	xvi	Crompton & Co., Ltd. ...	xxviii
Cables and Cable Accessories (Manufacturers of) :		Edison Swan Electric Co., Ltd., The	lxii
Bullivant & Co., Ltd. ...	lvi	Electric Construction Co., Ltd., The	ii
Henley's, W. T., Telegraph Works Co., Ltd. ...	ix	Ercole Marelli & Co., Ltd.	lx
Johnson & Phillips, Ltd. ...	xxv	Johnson & Phillips, Ltd.	xxv
London Electric Wire Co. & Smith, Ltd., The ...	v	Kartret Engineering Co., Ltd., The	xxxii
L.P.S. Electrical Co., The	xxiv	Mackie, W., & Co. ...	lxxiv
Pirelli Ltd.	xxxv	Officine Elettro-Meccaniche Società Anonima ...	iv
Simmonds Bros., Ltd. ...	xxx	Vickers Ltd.	liv
Whitecross Co., Ltd., The	xii	Engineers' and Electrical Stores :	
		Berk, F. W., & Co., Ltd.	lviii
		D.P. Battery Co., Ltd., The	lviii

CLASSIFIED INDEX TO ADVERTISERS

	PAGE		PAGE
Engineers' and Electrical Stores—contd.:		Lifts :	
Graham & Latham, Ltd...	lxvi	Steven, A. & P. ...	viii
Humber Wood Wool Fibre Mills Co., Ltd. ...	iv	Maps, Charts, etc. :	
Isenthal & Co., Ltd. ...	xxiii	" Geographia," Ltd. ...	xxix
Mitchell's Electrical and Wireless, Ltd. ...	xx	Potter, J. D. ...	xxiv
Pirelli Ltd. ...	xxxv	Loose Leaf Binders:	
Sullivan, H. W. ...	1	Spicer Brothers, Ltd. ...	xciv
India Rubber and Ebonite Manufacturers :		Motor Body Builders :	
American Hard Rubber Co. (Britain), Ltd. ...	xvi	Hood & Bodies, Ltd. ...	xcv
Britannia Rubber and Kamptulicon Co., Ltd. ...	lxvi	Oil Engines, Motors and Generators :	
Instruments and Accessories :		Ansaldo San Giorgio ...	xv
L.P.S. Electric Co., The ...	xxiv	Oil Suppliers :	
Marconi Scientific Instrument Co., Ltd., The ...	xxxix	" All's Well " Oil Co., Ltd. ...	vi
Vickers Ltd. ...	liv	Anglo-American Oil Co., Ltd. ...	cxi
Insulating Varnishes and Compounds :		Printers and Publishers :	
Pinchin, Johnson & Co., Ltd. ...	xlvi	Eden Fisher & Co., Ltd....	lxxxvi
Spicer Brothers, Ltd. ..	xciv	Electrical Press, Ltd. ...	xcviii
Insurance Companies :		" Engineer, The " ...	iii
Commercial Union Assurance Co., Ltd. ...	lxxxvii	" Geographia," Ltd. ...	xxix
North British & Mercantile Insurance Co., Ltd. ...	xciii	" Journal of Commerce, The " ...	lxx
Lamps, Electric :		McCorquodale & Co., Ltd. ...	ciii
Edison Swan Electric Co., Ltd., The ...	lxii	Marconi International Code Co., Ltd., The ...	xvii
Lamps, Signalling :		McGraw-Hill Publishing Co., Ltd. ...	xcix
Graham & Latham, Ltd. ...	lxvi	Potter, J. D. ...	xxiv
Telford, Grier & Mackay... ..	xliv	Sanders Phillips & Co., Ltd. ...	xxii
		" Syren & Shipping " ..	xiv
		Wireless Press, Ltd., The	lxxxviii, xcvi, xcvi, ciii, cx
		" Wireless World, The "...	civ

CLASSIFIED INDEX TO ADVERTISERS

	PAGE		PAGE
Ships' Chandlers :		Steel Towers :	
Chandler, Lindsay & Co....	ciii	Milliken Brothers Manu- facturing Co. Inc. ...	xxvii
Coubro & Scrutton, Ltd....	xxxviii	Stewarts and Lloyds, Ltd.	lii
McGeoch, William, & Co., Ltd.	xviii		
Shipping Agents, Brokers, Contractors, etc.		Telegraph and Telephone In- stallations :	
Chadwick, Joseph, & Sons	c	Amalgamated Wireless (Australasia), Ltd. ...	lxxii
Chadwick, Weir & Co., Ltd.	lxviii	Brown, S. G., Ltd. ...	xxxii
Dougall & Stirrat ...	lxi	Relay Automatic Tele- phone System, The ...	lxxiv
		Sterling Telephone & Elec- tric Co., Ltd.	vii
Shipping Companies :		Uniforms and Outfits :	
Aberdeen Line, The ...	cx	Harveys'	xl
Bibby Bros. & Co. (Bibby Line)	cvii	Miller, Rayner & Haysom, Ltd.	xi
Cayzer, Irvine & Co., Ltd. (Clan Line)	cvi	Paisleys Ltd.	xiii
Commonwealth and Do- minion Line, Ltd. ...	cvii	Self & Son	vi
Elder Dempster & Co., Ltd.	cviii		
Ellerman's Wilson Line, Ltd.	civ	Wire Manufacturers :	
Federal Steam Navigation Co., Ltd.	cii	Bullivant & Co., Ltd. ...	lvi
Holland-America Line, The	cix	London Electric Wire Co. & Smiths Ltd., The ...	v
Koninklijke Paketvaart Maatschappij	cvi	L.P.S. Electrical Co., The	xxiv
Lamport & Holt, Ltd ...	cx	Ormiston, P., & Sons ...	viii
Lloyd Sabaudo	lxxxviii	Pirelli	xxxv
Lloyd Triestino Societa di Navigazione a Vapore	ci	Whitecross Co., Ltd., The	xii
Navigazione Generale Itali- ana-Lloyd Italiano ...	cix		
New Zealand Shipping Co., Ltd.	cii	Wireless Experimenters:	
Prince Line, Ltd. ...	cviii	Tingey	xlviii
Rotterdam Lloyd Royal Mail Line	cv		
Società Nazionale di Navigazione	ci	Wireless Masts, Spars, Fittings, etc. :	
		Chandler, Lindsay & Co....	lxii
		Coubro & Scrutton, Ltd	xxxviii
		McGruer Hollow Spar Co., Ltd.	xxxvii

CLASSIFIED INDEX TO ADVERTISERS

	PAGE		PAGE
Wireless Telegraph Apparatus :		Wireless Telegraph Services :	
Amalgamated Wireless (Australasia), Ltd. ...	lxxii	Associated Marconi Com- panies Representatives and Agents, Offices of...	xliv
Burnham & Co. ...	lxxxv	Compania Nacional de Telegrafia sin Hilos ...	xxxiii
Compania Nacional di Telegrafia sin Hilos ...	xxxiii	Marconi International Marine Communication Co., Ltd. lxxxix, xc, xci, xcii	
Creed & Co., Ltd....	xxxi	Marconi International Marine Communication Co., Ltd. (Depôts and Inspecting Stations) xc, xci, xcii	
Marconi International Marine Communication Co., Ltd. ...	lxxxix	Marconi's Wireless Tele- graph Co., Ltd. xliii, xlv, xlv and Back Cover	
Marconi's Wireless Tele- graph Co., Ltd. xliii, xlv, xlv and Back Cover		Marconi Wireless Tele- graph Co. of Canada, Ltd., The ...	xxxvi
Mullard Radio Valve Co. ...	xxix	Radio Corporation of America ...	xix
R.M. Radio, Ltd. ...	xviii		
Sterling Telephone and Electric Co., Ltd. ...	vii		
Sullivan, H. W. ...	l		
Wireless Telegraph and Cable Schools :			
Dominion College of Radio- Telegraphy, Ltd., The...	x		
Marconi Schools of Radio- telegraphy, The ...	x		

PREFACE

WIRELESS telegraphy, with its sister science, wireless telephony, offers so many avenues of exploration to the scientific research worker that an article from the pen of one of these experts cannot fail to prove of immense value to those who peruse it. We have endeavoured, and we think with some measure of success, to include articles on subjects as diverse as possible.

Under this head will be found a discursive contribution on the Radio Compass, by Mr. Stuart Ballantine, an American, who for some years has devoted his attention to research connected with this branch of the Radiotelegraphic Service. It has made rapid strides of late, and owing to its recognised value with regard to shipping is of the utmost importance. Many ships are now equipped with Direction Finding Apparatus, enabling them to take bearings of any wireless coast station, but in order that the full benefit of this may be felt it is necessary that the accurate geographical position of all such coast stations should be available to shipmasters. The degree of accuracy should be to the nearest second. If this be not attained the work carried out by means of the apparatus will be nullified. In order to reduce the possibility of error and to render this class of wireless working successful, the exact position of the coast station constitutes an essential factor. We have enlisted, and, in the majority of cases, secured, the kind co-operation, in this work of public utility, of most of the Governments of the world, and the result has been that the geographical positions of the land stations in our book are more accurate than in many of the current official publications giving similar information.

Mr. P. R. Coursey, B.Sc., contributes an article of absorbing interest on "Some Outstanding Problems of Radio Reception—Interference," which will doubtless be studied with avidity by a large number of our readers.

A description of a modern shipboard wireless set will be highly valued, giving, as it does, a detailed examination of the apparatus for use on our modern liners and other sea-going vessels. This has been ably written by Mr. F. P. Swann, and deals with the four-electrode

PREFACE

valve and its circuits. The author is an expert who is constantly engaged in research work connected with this apparatus and his discourse, therefore, may be considered as authoritative from every standpoint.

The year 1921 sees the twenty-fifth anniversary of the taking out by Senatore Marconi of his first patent for wireless telegraphy (June 2nd, 1896). It has been considered not inappropriate to include a technically historical article from the pen of Professor G. W. O. Howe, D.Sc., entitled, "Historical Landmarks in Wireless Invention," and we venture to think that our readers will find this article of a highly valuable and interesting character.

A new feature this year is the inclusion of a list (not by any means exhaustive) of schools and colleges, both at home and abroad, where wireless telegraphy and telephony are taught. As full details as possible are given, and it is hoped that the section will prove of utility to our readers. In succeeding issues it is hoped considerably to amplify this section.

The other and standard features in our Annual have all been thoroughly revised and brought as up to date as circumstances would permit at the time of going to press. Our chief aim, however, has been, and always will be, to present to our readers that which is of the greatest interest and utility to them, and in order that this object may be attained we appeal to our wide circle of friends to communicate with the Editor on any matter concerning the contents of this book. Any genuine suggestions will be welcomed at all times and will receive careful consideration.

Before concluding this Preface, we desire to express our indebtedness to the many friends and correspondents, both at home and abroad, who have helped to make the 1921 volume of our Annual the success we believe it to be.

THE EDITOR.

12-13, Henrietta Street, Strand,
London, W.C.2,
15th February, 1921.

C A L E N D A R S E C T I O N

- (A) Almanack, January—December, 1921.**
- (B) Jewish and Mohammedan Calendars.**
- (C) Bank Holidays and Quarter Days.**
- (D) List of the World's Official Holidays.**
- (E) Tabular Calendars for 1920 and 1922.**

JANUARY, 1921

PHASES OF THE MOON.*				SUN.*	
Jan.	h. m.	Jan.	h. m.	Rises.	Sets.
8	● New Moon	23	○ Full Moon		
16	☾ First Quarter	30	☾ Last Quarter		
				h. m.	h. m.
1	S	Prof. Hertz died, 1894.		8 8	3 59
2	S	2nd Sunday after Christmas		8 8	4 0
3	M	Capitulation of Port Arthur, 1905.		8 8	4 2
4	T			8 7	4 3
5	W			8 7	4 4
6	Th	Epiphany. Twelfth day.		8 7	4 5
7	F			8 6	4 6
8	S	Evacuation of Gallipoli, 1916.		8 6	4 8
9	S	1st Sunday after Epiphany		8 6	4 9
		International Conference for Safety of Life at Sea closed, 1914.			
10	M	British Penny Postage established, 1840.		8 5	4 10
11	T	HILARY LAW SITTINGS BEGIN.		8 4	4 12
12	W	Marshal Joffre born, 1852.		8 4	4 13
13	Th	St. Hilary.		8 3	4 15
14	F	Duke of Clarence died, 1892.		8 2	4 16
15	S	British Museum opened, 1759.		8 2	4 18
16	S	2nd Sunday after Epiphany. Sir E. H. Shackleton reaches magnetic South Pole, 1909.		8 1	4 19
17	M	Benjamin Franklin born, 1706; died April 17th, 1790.		8 0	4 21
18	T	Capt. Scott reached South Pole, 1912.		7 59	4 22
19	W	First German air raid by Zeppelins, 1915.		7 58	4 24
20	Th	"Safety of Life at Sea" Convention signed at London, 1914.		7 57	4 26
21	F			7 56	4 28
22	S	Queen Victoria died, 1901.		7 55	4 29
23	S	Septuagesima Sunday. Republic wrecked, 1909. Passengers and crew saved.		7 53	4 31
24	M	Naval Battle off Dogger Bank, 1915.		7 52	4 33
25	T	Conversion of St. Paul.		7 51	4 34
26	W	Death of General Gordon and Fall of Khartoum, 1885.		7 50	4 36
27	Th	William II, ex-German Emperor, born, 1859.		7 48	4 38
28	F	Röntgen Rays discovered, 1896.		7 47	4 40
29	S	Capitulation of Paris, 1871.		7 46	4 41
30	S	Sexagesima Sunday.		7 44	4 43
31	M	Great Eastern steamer launched, 1858.		7 43	4 45

* The time shewn throughout this Calendar is Greenwich Mean Time.

FEBRUARY, 1921

PHASES OF THE MOON.

Feb. 7	● New Moon	h. m. 12 36'9	Feb. 21	○ Full Moon	h. m. 21 32'3
15	☾ First Quarter	6 53'2			

SUN.

			Rises.	Sets.
			h. m.	h. m.
1	T		7 41	4 47
2	W	<i>Candlemas.</i>	7 40	4 49
3	Th	British Telegraphs transferred to Government, 1870.	7 38	4 51
4	F	Thomas Carlyle died, 1881.	7 36	4 52
5	S		7 35	4 54
6	S	Quinquagesima Sunday	7 33	4 56
7	M	Chas. Dickens born, 1812; died June 9th, 1870.	7 31	4 58
8	T	<i>Shrove Tuesday.</i>	7 30	5 0
9	W	Asb Wednesday	7 28	5 2
10	Th	Lord C. Beresford born, 1846.	7 26	5 3
11	F	T. A. Edison born, 1847.	7 24	5 5
		London University founded, 1826.		
12	S		7 22	5 7
13	S	1st Sunday in Lent.	7 20	5 9
14	M	<i>St. Valentine.</i>	7 19	5 11
		Russia abandons the Allies, 1918.		
15	T	Sir Wm. Preece born, 1834.	7 17	5 13
16	W		7 15	5 14
17	Th	Sir Wilfred Laurier died, 1919.	7 13	5 16
18	F	German Submarine blockade declared, 1915.	7 11	5 18
19	S	Alessandro Volta born, 1745; died March 5th, 1827.	7 9	5 20
20	S	2nd Sunday in Lent	7 7	5 22
		Battle of Verdun begun, 1916.		
21	M	Fall of Jericho, 1918.	7 5	5 23
22	T	Prof. Hertz born, 1857.	7 3	5 25
23	W	Johann Karl Friedrich Gauss died, 1855.	7 1	5 27
24	Th	<i>St. Matthias.</i>	6 59	5 29
25	F	Sir Christopher Wren died, 1723.	6 57	5 31
26	S	<i>La Provence</i> sunk in Mediterranean, 1916. 870 persons saved.	6 55	5 32
27	S	3rd Sunday in Lent	6 53	5 34
28	M	Relief of Ladysmith, 1900.	6 51	5 36

MARCH, 1921

PHASES OF THE MOON.					SUN.	
Mar. 1		h. m.		h. m.		
(Last Quarter		2 3'2		Mar. 23 ○ Full Moon 8 18'9		
9 ● New Moon		6 9'2		30 (Last Quarter 21 13'4		
16) First Quarter		15 49'2				
					Rises.	Sets.
					h. m.	h. m.
1	T	St. David.			6 48	5 38
2	W	St. Chad.			6 46	5 39
3	Th	Dr. Alexander Bell born, 1847.			6 44	5 41
4	F	Inauguration Day, U.S.A.			6 42	5 43
5	S	Alessandro Volta died, 1827.			6 40	5 45
6	S	4th Sunday in Lent			6 37	5 47
7	M				6 35	5 48
8	T	Royal Institution founded, 1799.			6 33	5 50
9	W	Battle of Vimy Ridge, 1917.			6 31	5 52
10	Th	Battle of Neuve Chapelle, 1915.			6 29	5 53
11	F	Baghdad captured, 1917.			6 26	5 55
12	S	John F. Daniell born, 1790; died March 13th, 1845.			6 24	5 57
13	S	5th Sunday in Lent			6 22	5 59
14	M				6 20	6 0
15	T	Abdication of Czar, 1917.				
16	W	Georg Simon Ohm born, 1787; died July 7th, 1854.			6 17	6 2
		Senatore G. Marconi married at St. George's, Hanover Square, to the Hon. Beatrice O'Brien, 1905.			6 15	6 4
17	Th	St. Patrick.			6 13	6 5
18	F	Dardanelles naval attack, 1915.			6 10	6 7
19	S	First meeting of Empire War Cabinet, 1917.			6 8	6 9
20	S	Palm Sunday			6 6	6 11
		Sir Isaac Newton died, 1727; born December 25th (O.S.), 1642.				
21	M	Battle of Cambrai, 1918.			6 4	6 12
22	T	Battle of St. Quentin, 1918.			6 1	6 14
23	W				5 59	6 16
24	Th	Maundy Thursday. Sussex torpedoed, 1916.			5 57	6 17
25	F	Good Friday			5 54	6 19
26	S	Battle of Gaza, 1917.			5 52	6 21
27	S	Easter Day			5 50	6 22
		English Channel spanned by wireless, 1899.				
		Wm. Konrad von Röntgen born, 1845.				
28	M	Easter Monday			5 48	6 24
29	T	Easter Tuesday			5 45	6 26
30	W	Captain Scott died, 1912.			5 43	6 27
31	Th	Robert Wilhelm Bunsen born, 1811; died August 6th, 1899.			5 41	6 29

APRIL, 1921

PHASES OF THE MOON.

SUN.

Apr. 7	● New Moon	h. m. 21 5'2	Apr. 21	○ Full Moon	h. m. 19 49'4
14	☾ First Quarter	22 11'6	29	☾ Last Quarter	16 8'7

			Rises.	Sets.
			h. m.	h. m.
1	F		5 38	6 31
2	S	Battle of Copenhagen, 1801.	5 36	6 32
3	S	Low Sunday	5 34	6 34
4	M	Sir William Crookes, O.M., died, 1919; born, June 17th, 1832.	5 32	6 36
5	T	United States declared war on Germany, 1917.	5 30	6 37
6	W	Prof. Adolf Slaby died, 1913; born, 1850.	5 27	6 39
7	Th	Commander Peary reached North Pole, 1909.		
8	F	Archbishop of Canterbury born, 1848.	5 25	6 41
9	S	Anglo-French Convention signed, 1904.	5 23	6 42
		Vimy Ridge taken, 1917.	5 21	6 44
10	S	2nd Sunday after Easter	5 18	6 46
11	M	American Civil War commenced, 1861.	5 16	6 47
12	T	Albert Medal (Royal Society of Arts) presented to Senatore G. Marconi, 1914.	5 14	6 49
13	W	Magdala, 1868.	5 12	6 51
14	Th	President Lincoln assassinated, 1865.	5 10	6 52
15	F	<i>Titanic</i> disaster, 1912; over 700 lives saved.	5 7	6 54
16	S	HILARY LAW SITTINGS END.	5 5	6 56
17	S	3rd Sunday after Easter	5 3	6 57
		Russians captured Trebizond, 1916.		
18	M	Earthquake and fire at San Francisco, 1906.	5 1	6 59
19	T	Lord Beaconsfield died, 1881.	4 59	7 0
20	W		4 57	7 2
21	Th	"Mark Twain" died, 1910.	4 55	7 4
22	F	Foundation of Royal Society, 1662.	4 53	7 5
23	S	Shakespeare died, 1616.	4 51	7 7
24	S	4th Sunday after Easter	4 49	7 9
		Russo-Turkish War begun, 1877.		
25	M	Senatore Guglielmo Marconi, G.C.V.O., born, 1874.	4 47	7 10
26	T	Allied Troops land at Gallipoli, 1915.	4 45	7 12
27	W	Samuel F. B. Morse born, 1791; died, 1872.	4 43	7 14
28	Th	Prof. Guthrie Tate born, 1831; died July 4th, 1901.	4 41	7 15
29	F	EASTER LAW SITTINGS BEGIN.	4 39	7 17
30	S	Johann Karl Friedrich Gauss born, 1777; died February 23rd, 1855.	4 37	7 19

MAY, 1921

PHASES OF THE MOON.

SUN.

		h. m.				h. m.			
May 7	● New Moon	9	15	May 21	○ Full Moon	8	15.4		
14	☾ First Quarter	3	24.8	29	☾ Last Quarter	9	44.6	Rises.	Sets.
								h.m.	h. m.
1	S	Rogation Sunday						4 35	7 20
2	M							4 33	7 22
3	T	Jamaica discovered, 1494.						4 31	7 23
4	W	Italy denounced Treaty of Triple Alliance, 1915.						4 29	7 25
5	Th	Ascension Day.						4 27	7 27
6	F	Accession of King George V., 1910.						4 26	7 28
7	S	Lusitania torpedoed, 1915.						4 24	7 30
8	S	Sunday after Ascension						4 22	7 32
9	M							4 21	7 33
10	T	Imperial Institute, London, opened, 1893.						4 19	7 35
11	W	Halley's comet appeared, 1910.						4 17	7 36
12	Th							4 16	7 38
13	F							4 14	7 39
14	S	First vaccination by Dr. Jenner, 1796.						4 13	7 41
15	S	Whit Sunday						4 11	7 42
		Presentation of Franklin Medal to Senatore Marconi, 1918.							
16	M	Whit Monday						4 10	7 44
17	T	Whit Tuesday						4 8	7 45
18	W	New Eddystone Lighthouse opened, 1882.						4 7	7 47
19	Th	Last Air Raid, London, 1918.						4 5	7 48
20	F	Christopher Columbus died, 1506.						4 4	7 50
21	S	Manchester Ship Canal opened, 1894.						4 3	7 51
22	S	Trinity Sunday						4 1	7 52
23	M							4 0	7 54
24	T	Empire Day.						3 59	7 55
25	W	Lloyd's incorporated, 1871.						3 58	7 56
26	Th	Corpus Christi.						3 57	7 58
27	F	Majestic torpedoed, 1915.						3 56	7 59
28	S	Annexation of Orange Free State, 1900.						3 55	8 0
29	S	1st Sunday after Trinity						3 54	8 1
		Empress of Ireland disaster, 1914; 541 lives saved.							
30	M							3 53	8 2
31	T	Battle of Jutland, 1916.						3 52	8 4

JUNE, 1921

PHASES OF THE MOON.				SUN.	
June		h. m.	June	h. m.	
5	● New Moon	18 14'7"	19	○ Full Moon	21 41'3"
12	☾ First Quarter	8 59'5"	28	☾ Last Quarter	1 17'0"
				Rises.	Sets.
				h. m.	h. m.
1	W			3 50	8 5
2	Th	General Sir Redvers Buller, V.C., died, 1908.		3 50	8 6
3	F	King George V. born, 1865.		3 49	8 7
4	S	George III. born, 1738.		3 49	8 8
5	S	2nd Sunday after Trinity Earl Kitchener drowned, 1916.		3 48	8 9
6	M	EASTER LAW SITTINGS END.		3 48	8 10
7	T	Messines Ridge captured, 1917.		3 47	8 11
8	W			3 46	8 11
9	Th	Charles Dickens died, 1870.		3 46	8 12
10	F	André Marie Ampère born, 1775 ; died, 1836.		3 46	8 13
11	S	<i>St. Barnabas.</i>		3 45	8 14
12	S	3rd Sunday after Trinity Sir Oliver Lodge born, 1851.		3 45	8 14
13	M			3 45	8 15
14	T	Allied Economic Conference at Paris, 1916.		3 44	8 16
15	W	Trans-Atlantic flight by Alcock and Brown, 1919.		3 44	8 16
16	Th	<i>Drummond Castle</i> lost, 1896.		3 44	8 17
17	F	TRINITY LAW SITTINGS BEGIN. Sir W. Crookes born, 1832.		3 44	8 17
18	S	War with U.S.A., 1812. Waterloo, 1815.		3 44	8 17
19	S	4th Sunday after Trinity Field-Marshal Earl Haig born, 1861.		3 44	8 18
20	M	Accession of Queen Victoria, 1837.		3 44	8 18
21	T	Germans sink their warships at Scapa Flow, 1919.		3 44	8 18
22	W	M. Poincaré announced to the Académie des Sciences Becquerel's discovery of a positive electron in a Crookes tube, 1908.		3 45	8 19
23	Th	Formal institution of Royal Society of Edinburgh, 1783.		3 45	8 19
24	F	<i>St. John the Baptist.</i> Midsummer Day.		3 45	8 19
25	S	Navigation Acts repealed, 1849.		3 46	8 19
26	S	5th Sunday after Trinity Lord Kelvin born, 1824 ; died December 17th, 1907.		3 46	8 19
27	M			3 46	8 19
28	T	Peace signed between Germany and the Allies, 1919		3 47	8 19
29	W	<i>St. Peter.</i>		3 47	8 19
30	Th	Tower Bridge opened, 1894. Lord Rayleigh died 1919 ; born Nov. 12th, 1842.		3 48	8 18

JULY, 1921

PHASES OF THE MOON.				SUN.	
		h. m.			
July 5	● New Moon	1 36.3	July 19	○ Full Moon	12 7.7
11	) First Quarter	16 15.7	27	(Last Quarter	14 19.9
				Rises.	Sets.
				h. m.	h. m.
1	F	Battle of the Boyne, 1690.		3 49	8 18
2	S			3 49	8 18
3	S	6th Sunday after Trinity Sadowa, 1866.		3 50	8 17
4	M	Declaration of American Independence, 1776.		3 51	8 17
5	T			3 52	8 17
6	W	King George's marriage, 1893.		3 52	8 16
7	Th	Daylight Air Raid on London, 1917.		3 53	8 15
8	F	Joseph Chamberlain born, 1836; died July 2nd, 1914.		3 54	8 15
9	S	Conquest of German South-West Africa, 1915.		3 55	8 14
10	S	7th Sunday after Trinity		3 56	8 13
11	M	Bombardment of Alexandria, 1882.		3 57	8 13
12	T	Electric Units Bill legalising electric standards passed Congress, U.S.A., 1894.		3 58	8 12
13	W	R 34 accomplished Atlantic Flight, 1919.		3 59	8 11
14	Th	Bastille stormed, 1789. French Public Holiday.		4 0	8 10
15	F	Battle of the Marne begun, 1918.		4 2	8 9
16	S	Conquest of German South-West Africa, 1915. Nicholas II. of Russia assassinated, 1918.		4 3	8 8
17	S	8th Sunday after Trinity		4 4	8 7
18	M	Foch's counter-attack begun, 1918.		4 5	8 6
19	T			4 6	8 5
20	W	St. Margaret.		4 8	8 4
21	Th	Robert Burns died, 1796.		4 9	8 3
22	F	St. Mary Magdalene.		4 10	8 1
23	S	Austrian Ultimatum to Serbia, 1914.		4 12	8 0
24	S	9th Sunday after Trinity Honorary G.C.V.O. conferred on Senatore Marconi, 1914.		4 13	7 59
25	M	St. James.		4 14	7 57
26	T			4 16	7 56
27	W	Captain Fryatt shot, 1916.		4 17	7 55
28	Th	Austria-Hungary declared war on Serbia, 1914.		4 19	7 53
29	F	Spanish Armada dispersed, 1588.		4 20	7 52
30	S	TRINITY LAW SITTINGS END.		4 21	7 59
31	S	10th Sunday after Trinity Passing of British Telegraph Act, 1868.		4 23	7 49

AUGUST, 1921

PHASES OF THE MOON.

SUN.

Aug. 3 ● New Moon h. m. 8 17.5 | Aug. 26 ○ Full Moon h. m. 3 28.3
 10) First Quarter 2 13.7 | 18 (Last Quarter 0 51.4

Rises. Sets.

h. m. h. m.

1	M	<i>Lammas Day.</i>	4 24	7 47
2	T	Fall of Soissons, 1918.	4 26	7 45
3	W	Germany declared war on France, 1914.	4 27	7 44
4	Th	Great Britain declared war on Germany, 1914. First International Wireless Conference met at Berlin, 1903. Suspension of Transatlantic Wireless Service, 1917	4 29	7 42
5	F	First British-American cable worked, 1858.	4 31	7 40
6	S	<i>Transfiguration.</i>	4 32	7 39
7	S	11th Sunday after Trinity .	4 34	7 37
8	M		4 35	7 35
9	T	Heligoland formally ceded to Germany, 1890.	4 37	7 33
10	W	France declared war on Austria-Hungary, 1914.	4 38	7 31
11	Th	Cardinal Newman died, 1890.	4 40	7 29
12	F	Great Britain declared war on Austria-Hungary, 1914.	4 41	7 28
13	S	Liège forts destroyed, 1914.	4 43	7 26
14	S	12th Sunday after Trinity	4 44	7 24
15	M	Panama Canal opened, 1914.	4 46	7 22
16	T	Robert Wilhelm Bunsen died, 1899; born March 31st, 1811. William Hyde Wollaston born, 1776, died, December 22nd, 1828.	4 48	7 20
17	W		4 49	7 18
18	Th		4 51	7 16
19	F	White Star liner <i>Arabic</i> sunk by German submarine, 1915.	4 52	7 14
20	S	Italy declared war on Turkey, 1915.	4 54	7 12
21	S	13th Sunday after Trinity	4 56	7 10
22	M	Fall of Namur, 1914.	4 57	7 8
23	T	Chas. Augustin de Coulomb born, 1736, died. 1806	4 59	7 5
24	W	<i>St. Bartholomew.</i> Louvain destroyed, 1914.	5 0	7 3
25	Th	Conquest of Togoland, 1914.	5 2	7 1
26	F	Roumania declared war on Austria-Hungary, 1916	5 3	6 59
27	S	Italy declared war on Germany, 1916.	5 5	6 57
28	S	14th Sunday after Trinity Germany declared war on Roumania, 1916. Trial of first submarine telegraph, 1850.	5 7	6 55
29	M		5 8	6 53
30	T	Turkey declared war on Roumania, 1916.	5 10	6 50
31	W	Hermann von Helmholtz born, 1821; died September 8th, 1894.	5 11	6 48

SEPTEMBER, 1921

PHASES OF THE MOON.						SUN.	
Sept.		h. m.	Sept.	h. m.		Rises.	Sets.
1	● New Moon	15 33'0	16	○ Full Moon	19 20'0		
8	☾ First Quarter	15 29'5	24	☾ Last Quarter	9 17'7		
						h. m.	h. m.
1	Th	<i>St. Giles.</i> Fall of Péronne, 1918.				5 13	6 46
2	F	Board of Trade (Great Britain) constituted, 1786.				5 15	6 44
3	S	Fall of Riga, 1917.				5 16	6 42
4	S	15th Sunday after Trinity First Night Aeroplane Raid on London, 1917.				5 18	6 39
5	M					5 19	6 37
6	T	<i>Mayflower</i> sailed, 1620.				5 21	6 35
7	W	<i>St. Evurtius.</i>				5 23	6 33
8	Th	Sir John Henniker Heaton, Bart., died, 1914 ; born 1848.				5 24	6 30
9	F	Luigi Galvani born, 1737 ; died December 4th, 1798.				5 26	6 28
10	S					5 27	6 26
11	S	16th Sunday after Trinity First Battle of the Aisne, 1914.				5 29	6 24
12	M					5 31	6 21
13	T	Quebec taken, 1759.				5 32	6 19
14	W	<i>Holy Cross.</i>				5 34	6 17
15	Th	Liverpool and Manchester Railway opened, 1830.				5 35	6 14
16	F	Mr. A. Bonar Law born, 1858.				5 37	6 12
17	S	London and Birmingham Railway opened, 1838.				5 39	6 10
18	S	17th Sunday after Trinity Jean Barnard Leon Foucault born, 1819 ; died, March 11th, 1908.				5 40	6 7
19	M					5 42	6 5
20	T					5 43	6 3
21	W	<i>St. Matthew.</i>				5 45	6 0
22	Th	Michael Faraday born, 1791 ; died August 25th, 1867.				5 47	5 58
23	F	Autumnal Equinox.				5 48	5 56
24	S					5 50	5 54
25	S	18th Sunday after Trinity Bulgarians proposed armistice, 1918.				5 51	5 51
26	M	King of Denmark born, 1870.				5 53	5 49
27	T					5 55	5 47
28	W	British captured Kut-el-Amara, 1915.				5 56	5 44
29	Th	<i>St. Michael and All Angels.</i>				5 58	5 42
30	F	Surrender of Bulgaria, 1918.				6 0	5 40

OCTOBER, 1921

PHASES OF THE MOON.

Oct. 1	● New Moon	h. m. 0 26.4	Oct. 23	(Last Quarter	h. m. 16 31.5
8	☾ First Quarter	8 11.8	30	● New Moon	11 38.8
16	○ Full Moon	10 59.6			

SUN.

Rises. Sets.

			h. m.	h. m.
1	S	Pheasant shooting begins.	6 1	5 37
2	S	19th Sunday after Trinity	6 3	5 35
3	M		6 5	5 33
4	T	German proposal for armistice, 1918.	6 6	5 31
5	W	Republic of Portugal proclaimed, 1910.	6 8	5 28
6	Th	Invasion of Serbia by Germans, 1915.	6 9	5 26
7	F		6 11	5 24
8	S		6 13	5 22
9	S	20th Sunday after Trinity	6 14	5 19
		Cambrai retaken, 1918.		
		Germans occupied Antwerp, 1914.		
10	M	Panama Canal completed, 1913.	6 16	5 17
11	T	Vollurno burnt in mid-Atlantic, 1913. 521	6 18	5 15
		persons saved.		
12	W	Nurse Cavell shot by Germans, 1915.	6 19	5 13
13	Th	MICHAELMAS LAW SITTINGS BEGIN.	6 21	5 11
14	F	Great Britain declared war on Bulgaria, 1915.	6 23	5 9
15	S	The Gregorian Calendar introduced, 1582.	6 25	5 6
16	S	21st Sunday after Trinity	6 26	5 4
		Houses of Parliament burnt, 1834.		
17	M		6 28	5 2
18	T	St. Luke.	6 30	5 0
19	W	Sir Charles Wheatstone born, 1802; died, 1875.	6 31	4 58
		First battle of Ypres began, 1914.		
20	Th		6 33	4 56
21	F	Trafalgar Day. Death of Lord Nelson, 1805.	6 35	4 54
22	S	Edouard Branly born, 1844.	6 37	4 52
23	S	22nd Sunday after Trinity	6 38	4 50
24	M	French Victory at Verdun, 1916.	6 40	4 48
25	T	St. Crispin.	6 42	4 46
26	W	Aleppo taken, 1918.	6 44	4 44
27	Th	Austria sued for peace, 1918.	6 45	4 42
28	F	St. Simon and St. Jude.	6 47	4 40
29	S		6 49	4 38
30	S	23rd Sunday after Trinity	6 51	4 36
		Armistice with Turkey, 1918.		
31	M	Beersheba taken, 1917.	6 52	4 34

NOVEMBER, 1921

PHASES OF THE MOON						SUN.	
Nov. 7	15	First Quarter	h. m.	Nov. 21	29	Last Quarter	h. m.
		Full Moon	3 33'8 1 39'1			New Moon	23 41'0 1 25'7
						Rises.	Sets.
						h. m.	h. m.
1	T	All Saints.				6 54	4 32
2	W	Naval Battle off Coronel, 1914.				6 56	4 30
3	Th	All Souls.				6 58	4 29
4	F	Yarmouth bombarded, 1914.				7 0	4 27
5	S	Great Britain declared war on Turkey, 1914.				7 1	4 25
6	S	24th Sunday after Trinity				7 3	4 24
7	M	Sir Wm. Preece died, 1913; born Feb. 15th, 1834.				7 5	4 22
8	T	"London Gazette" first published, 1565.				7 7	4 20
9	W	John Milton died, 1674.				7 9	4 19
		Armistice signed by German plenipotentiaries, 1918.					
10	Th	British at Mons, 1918.				7 10	4 17
11	F	Martinmas.				7 12	4 16
12	S	International Conference for Safety of Life at Sea opened, 1913.				7 14	4 14
		Lord Rayleigh born 1842; died June 30th, 1919.					
13	S	25th Sunday after Trinity				7 16	4 13
		Prof. Clerk Maxwell born, 1831; died November 5th, 1879.					
14	M	Earl Roberts, V.C., died, 1914.				7 17	4 11
15	T	St. Machutus.				7 19	4 10
16	W	Inauguration of the Suez Canal, 1869.				7 21	4 8
17	Th	St. Hugh.				7 22	4 7
18	F	Sir Stanley Maude died, 1917.				7 24	4 6
19	S	Ferdinand de Lesseps born, 1805; died December 7th, 1894.				7 26	4 4
20	S	26th Sunday after Trinity				7 27	4 3
		St. Edmund. Tolstoi died, 1910.					
21	M	St. Cecilia.				7 29	4 2
22	T	St. Clement.				7 31	4 1
23	W	Faraday's discovery of magneto-electricity announced to Royal Society, 1831.				7 32	4 0
24	Th	Sir Isaac Newton born, 1642; died March 20th, 1727.				7 34	3 59
25	F					7 36	3 58
26	S					7 37	3 57
27	S	Advent Sunday				7 39	3 56
		Wm. Cowper, poet, born, 1731; died April 25th, 1800.					
28	M					7 40	3 55
29	T					7 42	3 54
30	W	St. Andrew.				7 43	3 54

DECEMBER, 1921

PHASES OF THE MOON.

SUN.

		h. m.				h. m.			
Dec. 7	☾ First Quarter	1	19.5	Dec. 21	☾ Last Quarter	7	54.1		
14	☉ Full Moon	14	50.4	28	● New Moon	17	39.4	Rises.	Sets.
								h. m.	h. m.
1	Th	Queen Alexandra born, 1844.					7 45	3 53	
2	F	Austerlitz, 1805. Fall of Monastir, 1915.					7 46	3 52	
3	S	Thomas Carlyle born, 1795.					7 47	3 52	
4	S	2nd Sunday in Advent					7 49	3 51	
		R. L. Stevenson died, 1894; born, November 13th, 1850.							
5	M	Admiral Jellicoe born, 1859.					7 50	3 51	
6	T	St. Nicholas. Germans captured Bucarest, 1916.					7 51	3 50	
7	W						7 53	3 50	
8	Th	Falkland Islands Battle, 1914.					7 54	3 50	
9	F	Jerusalem occupied by British, 1917.					7 55	3 49	
10	S	Capt. Ross Smith completed aeroplane flight from London to Australia, 1919.					7 56	3 49	
11	S	3rd Sunday in Advent					7 57	3 49	
12	M	Robert Browning died, 1889.					7 58	3 49	
13	T	St. Lucy. Dr. Samuel Johnson died, 1784.					7 59	3 49	
14	W	George Washington died, 1799; born February 22nd, 1732.					8 0	3 49	
15	Th						8 1	3 49	
16	F	Amundsen reached the South Pole, 1911.					8 2	3 49	
17	S	Lord Kelvin died, 1907.					8 3	3 49	
18	S	4th Sunday in Advent					8 3	3 50	
		Sir J. J. Thomson born, 1856.							
19	M	Slavery abolished in U.S.A., 1862.					8 4	3 50	
20	T	MICHAELMAS LAW SITTINGS END.					8 5	3 50	
21	W	St. Thomas.					8 5	3 51	
22	Th	Winter Solstice.					8 6	3 51	
23	F						8 6	3 52	
24	S	First German Air Raid on England, 1914.					8 7	3 52	
25	S	Christmas Day					8 7	3 53	
26	M	St. Stephen.					8 7	3 54	
27	T	St. John. Boxing Day.					8 8	3 55	
28	W	Holy Innocents.					8 8	3 55	
29	Th	W. E. Gladstone born, 1809, died May 19th, 1898.					8 8	3 56	
30	F	H.M.T. Aragon sunk, 1917.					8 8	3 57	
31	S	St. Silvester.					8 8	3 58	

JEWISH CALENDAR

(A.D. 1921—A.M. 5681-5682)

The year 5681 of the Jewish Era began September 13th, 1920. The year 5682 will begin on October 3rd, 1921.

A.D. 1921		A.M. 5681	A.D. 1921		A.M. 5681
Jan. 10	New Moon	Shebat 1	Sept. 4	New Moon	Elul 1
Feb. 9	New Moon	Adar 1			A.M. 5682
Mar. 11	New Moon	Veader 1	Oct. 3	New Year, 5682 ..	Tishri 1
" 23	Fast of Esther ..	" 13	" 5	Fast of Gedaliah ..	" 3
" 24	Purim	" 14	" 12	Fast of Expiation ..	" 10
" 25	Do. 2nd day ..	" 15	" 17	Feast of Tabernacles ..	" 15
April 9	New Moon	Nisan 1	" 18	Do. 2nd day ..	" 16
" 23	Festival of Passover ..	" 15	" 23	Hosana Rabba ..	" 21
" 24	Do. 2nd day ..	" 16	" 24	Feast of the Eighth Day ..	" 22
" 30	Do. ends ..	" 21	" 25	Rejoicing of the Law ..	" 23
May 9	New Moon	Yiar 1	Nov. 2	New Moon	Mar-hesvan 1
June 7	New Moon	Sivan 1			Kislev 1
" 12	Pentecost	" 6	Dec. 2	New Moon	" 25
" 13	Do. 2nd day ..	" 7	" 26	Hanuca, Dedication of the Temple ..	" 25
July 7	New Moon	Tammuz 1	A.D. 1922		
" 23	Fast of Tammuz ..	" 17	Jan. 1	New Moon	Tebet 1
Aug. 5	New Moon	Ab 1			
Aug. 14	Fast of Ab	Ab 10			

NOTE.—All the Jewish Sabbaths and Festivals begin at Sunset on the previous evening.

MOHAMMEDAN CALENDAR

(Year 1339—1340)

The Year 1339 of the Mohammedan Era began on September 15th, 1920, and the Year 1340 will begin on September 4th, 1921.

Ramadán (Month of Abstinence) begins on May 9th, 1921.

Bairam (1st Shawall) begins June 8th, 1921.

Kurban-Bairam (the Festival of Sacrifice) begins August 6th, 1921.

Year.	Name of Month.	Month begins.	Year.	Name of Month.	Month begins.
		A.D. 1921			A.D. 1921
1339	Jomada I	January 11	1339	Dulheggia	August 6
"	Jomada II	February 10	1340	Muharram	September 4
"	Rajab	March 11	"	Saphar	October 4
"	Shaaban	April 10	"	Rabia I	November 2
"	Ramadán	May 9	"	Rabia II	December 2
"	Shawall	June 8	"	Jomada I	December 31
"	Dulkaada	July 7			

BANK AND GENERAL HOLIDAYS

ENGLAND.—Good Friday, Easter Monday, Whit Monday, First Monday in August, Christmas Day and December 26th, or (if that date be Sunday) December 27th.

IRELAND.—Same as in England, with addition of St. Patrick's Day (March 17th) or Monday following if the 17th fall on Sunday.

SCOTLAND.—New Year's Day, Good Friday, First Monday in May, First Monday in August and Christmas Day. If Christmas Day or New Year's Day fall on Sunday the Monday following is the Bank Holiday.

QUARTER DAYS

ENGLAND.—Lady Day, March 25th; Midsummer, June 24th; Michaelmas, September 29th; Christmas, December 25th.

SCOTCH.—Candlemas, February 2nd; Whitsun, May 15th; Lammas, August 1st; Martinmas, November 11th. The removal term days are—May 28th and November 28th. If a Scotch term, or quarter day, fall on Sunday, the Monday following is term day.

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES OF THE WORLD

ALGERIA.

- January 1.
Easter Monday.
Ascension Day.
Whit Monday.
- Fête Nationale, July 14.
Assumption, August 15.
All Saints' Day, November 1.
- Christmas Day, December 25.
* If these days fall two days before or after Sunday, the intervening day is a Customs holiday.

ARGENTINA.

- January 1 and 6.
- February 6, 7 and 8.
- March 19.
- Maundy Thursday.
- Good Friday.
- Easter Saturday.
- Easter Sunday.
- Ascension Day.
- May 25 and 26.
- June 29.
- July 9.
- August 15 and 30.
- October 12 (Buenos Aires only).
- November 1 and 11.
- December 8 and 25.

AUSTRALIA.

- New Year's Day.
- Good Friday.
- Easter Saturday and Monday, and Banks and Offices Tuesday also. (Tuesday is not observed in New South Wales.)
- King's Birthday.
- Prince of Wales's Birthday.
- Christmas Day.
- Boxing Day.
- Eight-Hour Day (different day in each State; day celebrating the granting of an eight-hour working day in those States where the principle is legalised).
- New South Wales—First Monday in October.
- Queensland—1st May.
- Each of the States has also a holiday known as Anniversary Day, to celebrate its foundation. In each State there are holidays, annual and declared, with regard to local events and anniversaries.
- In New South Wales January 26 (Anniversary Day) and first Monday in August are also holidays.
- In Victoria there are also local holidays: Foundation Day (January 26); Eight-Hour Day (April 23); and in Melbourne and vicinity, Melbourne Cup Day (first Tuesday in November), and Picnic Day.
- In Western Australia, Anniversary Day (June 1) and the Monday following October 26 are also holidays; also one day in March (Lumpers' Picnic Day).
- In South Australia, at Port Adelaide, the following are observed as holidays as announced in Government Gazette: New Year's Day (January 1); Foundation Day (January 31); Good Friday; Easter Monday; King's Accession (May 6); King's Birthday (June 5); Prince of Wales's Birthday (June 27); Eight-Hour Day (October 8); Christmas Day (December 25); Proclamation Day (December 28); Anniversary of the State.

BARBADOS.

- January 1st (if on Sunday, Monday is the holiday; if the mail arrive on holiday, the following Monday is the holiday).
- Good Friday, Easter Monday (if the mail arrive or leave on this day, the following Monday is the holiday), Whit Monday, May 24th (Empire Day), first Monday in August, August 11th (Thanksgiving Day), first Monday in October, December 25th (Christmas Day), December 26th (Boxing Day) (if on Sunday, Monday is the holiday).

BELGIUM.

- New Year's Day.
- Shrove Monday and Tuesday
- Easter Monday.
- Ascension Day.
- Whit Monday.
- July 21 (National Fête).
- August 4.
- August 15, Assumption.
- November 1, All Saints' Day.
- November 2, All Souls' Day.
- December 25, Christmas Day.
- December 26.
- In July at Ghent, and in August at Antwerp, there are also two days' local holidays (Kermesse), generally Monday and Tuesday.

BERMUDA.

- Good Friday, May 24th (Empire Day), December 25th (Christmas Day), December 26th (Boxing Day).

BRAZIL.

- January 1, 6.
- February 24.
- April 21.
- May 1, 3 and 13.
- June 29.
- July 14.
- August 15.
- September 7.
- October 12.
- November 1, 2 and 15.
- December 8 and 25.
- Easter (Good Friday and Monday) and Carnival—(seven weeks previous) (Monday, Tuesday and Wednesday).
- Ascension Day.
- Corpus Christi.
- Various other holidays of a local nature are observed in the different States.
- January 20 and September 20 are Federal District holidays.

BRITISH GUIANA.

- Easter Monday, Whit Monday, first Monday in August, December 26 (Boxing Day) (if on Sunday, Monday is the holiday).

CANADA.

- New Year's Day. January 6, Epiphany.*
- Good Friday. Ascension Day.* All Saints' Day.* Conception Day.* Easter Monday. Christmas Day.
- * These holidays are observed only in the Province of Quebec.

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES OF THE WORLD—continued.

CANADA—continued.

Empire Day (May 24).
July 1, Dominion Day.
First Monday in September (Labour Day).
King's Birthday, June 3, and any day
proclaimed as a general Fast or Thanks-
giving.

CHILE.

January 1, Good Friday and Saturday.
Ascension Day, May 21 (National
Feast). Corpus Christi, June 29, August
14, September 18 and 19 (National
Feast). November 1, December 8 and 25.

CHINA (HONG KONG).

New Year's Day.
Chinese New Year.
Good Friday.
Saturday before Easter.
Easter Monday.
Whit Monday.
King's Birthday.
July 1.
First Monday in August, second Monday
in October and November
Empire Day.
Christmas Day.
December 26.

CHINA (SHANGHAI).

New Year (January 1 and 2).
Chinese New Year (4 days, February 1-4).
Easter (3 days).
Whitsuntide (1 day).
October 10 (Anniversary of Republic).
Christmas (December 25 and 26).
In addition, the Banks keep the following
holidays:—Dragon Boat Festival (June),
Midsummer (July 1 and 2), Autumn
(First Monday in August), and Mid-
Autumn Festival, Chinese (September).
The Customs usually observe New Year
(3 days), Good Friday, Chinese New
Year, Dragon Boat and Mid-Autumn
Festivals, Anniversary (Oct. 11), Pro-
clamation (Feb. 12) of Republic,
December 22 and Christmas Day.

COCHIN CHINA (FRENCH).

New Year's Day. Chinese New Year
Festival. Easter Monday. Ascension
Day. Whit Monday. July 14, Assump-
tion (August 15). October 10, All
Saints' Day (November 1). All Souls'
Day (November 2), and Christmas Day.
If January 1, July 14, August 15 or Decem-
ber 25 fall on Sunday, the following day
is a legal holiday.

COLOMBIA.

January 1 and 6, Maundy Thursday. Good
Friday. Ascension Day. St. Peter
(June 29). July 20, Independence Day.
August 7 and 15. October 12, All
Saints' (November 1). December 8,
Christmas Day.

COSTA RICA.

January 1.
Three days in Holy Week (Semana Santa).
May 1, Opening of Congress.
September 15, Independence Anniversary.
October 12, Columbus Day.
Christmas Day.

CUBA.

January 1.
February 24.
May 20.
October 10.
December 7.
December 25.
Good Friday is not a legal holiday, but
is very strictly observed.

DENMARK.

New Year's Day. Easter (Thursday, Good
Friday and Monday). April 22 (Prayers
Day). Ascension Day. Whit Monday.
June 5 (Constitution Day) after noon.
Christmas Day and December 26, in
addition to all Sundays.

ECUADOR.

January 1, New Year's Day.
Good Friday.
August 10, Independence Days of Quito
October 9, and Guayaquil.
December 25, Christmas Day.

EGYPT.

Sultan's Birthday (March 26).
Sham-El-Nissim.
The King's Accession Day (May 6).
The King's Birthday (June 3).
Ramadan Bairam.
Qurban Bairam.
Holy Carpet (variable).
Mohammedan New Year's Day.
Sultan's Accession Day (October 9).
Birthday of the Prophet (November 12).
Sundays are also observed.

ESTHONIA.

New Year's Day (January 1).
Epiphany (January 6).
Declaration of the Independence (Feb. 24).
Day of Prayer and Repentance.
Thursday before Good Friday.
Good Friday.
Easter Sunday, Monday and Tuesday.
May Day (May 1).
Ascension Day. Maundy Thursday.
Pentecost Sunday, Monday and Tuesday.
Midsummer Day (June 24).
Martinmas.
Christmas Sunday, Monday and Tuesday.

FINLAND.

January 1 and 6; March 25; Easter (Good
Friday and Easter Monday); Ascen-
sion Day; June 24 (Midsummer Day);
Christmas Day and December 26.

FRANCE.

New Year's Day. Easter. Ascension
Day. Whitsuntide. French National
Fête, July 14. Assumption, August 15.
All Saints' Day. Christmas Day.

GERMANY.

New Year's Day.
Good Friday.
Easter Monday.
Ascension Day.
Whit Monday.
Third Wednesday in November (day of
Fasting and Prayer).
December 25 and 26.

GREECE.

New Year's Day (January 14).
Epiphany (January 19).
Independence Day (April 7).

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES
OF THE WORLD—continued.

GREECE—continued.

Good Friday.
Saturday before Easter.
Easter Monday.
St. George's Day (May 6).
Ascension.
Holy Ghost.
St. Peter (July 12).
Assumption (August 28).
St. Demetrius's Day (November 8).
Christmas, January 6, 7 and 8.
Dates given are new style.

The Shipping Community also observe
S. Nicolas's Day and S. Spiridon's Day
(December 19 and 25). Customs observe also
Christmas Eve, S. Constantine's Day
(June 3), S. Nicolas (December 19), S. Spiridon
(December 25).

GUATEMALA.

January 1.
March 15.
Easter.
June 30.
September 15 (Independence Day).
October 28.
November 21.
December 25.

HAITI.

All Sundays, January 1 and 2, May 1.
Holy Thursday, Good Friday, Mardi
Gras, Day of Pentecost, Fête Dieu,
Petite Dieu (half-day afternoon),
August 15, November 1 and 2, December
25.

HOLLAND.

New Year's Day, Easter Monday, Ascension
Day, Whit Monday, Christmas Day
and December 26.

HONDURAS (BRITISH).

The Birthday of the Sovereign.
The Birthday of the Heir to the Throne.
Victoria Day, May 24.
St. George's Caye Day, September 10.
New Year's Day.
Good Friday.
Christmas Day, December 25.

HONDURAS (REPUBLIC).

New Year's Day.
Holy Week and Independence Day
(September 15).
Christmas Day.

INDIA.

New Year's Day, Easter (Friday to
Monday), Emperor's Birthday, Christ-
mastide (three days), and various
Native Religious Festivals.

ITALY.

New Year's Day. Easter Sunday. Christ-
mas Day. Epiphany. Ascension Day.
June 24 (St. John the Baptist) (at
Genoa), August 15, Assumption. Sep-
tember 20 (National Holiday). Novem-
ber 1, All Saints' Day, November 4,
Victory Day.
At Civita Vecchia, April 28, S. Fermina
is observed.

JAMAICA.

January 1, Ash Wednesday, Good Friday,
Easter Monday, Whit Monday, May 24
(Empire Day), first Monday in August,
December 25 (Christmas Day), Decem-
ber 26 (Boxing Day).

JAPAN.

January 1 and 2. January 3 and 5.
February 11. March 22 (changeable).
Good Friday. Easter Monday. April 3.
July 30. First Monday in August
(Summer Holiday). August 31. Sep-
tember 24 (changeable). October 17.
October 31. November 23. Christmas
Day. December 26. December 31.

LATVIA.

January 1 and 6. Thursday before Good
Friday. Good Friday. Easter Monday.
Easter Tuesday. May 1. Ascension
Day. Whit Monday. Whit Tuesday.
June 23 and 24. Independence Day
(November 18). December 25, 26, 27.

LIBERIA.

New Year's Day (January 1); Pioneer's
Day (January 7); Decoration Day
(March 12); Good Friday (April 2);
National Fast Day (April 11); Indepen-
dence Day (July 26); National Flag Day
(August 24); Thanksgiving Day (Novem-
ber 6); Newport Day (December 1);
Christmas Day (December 25).

MEXICO.

New Year's Day. Epiphany (January 6).
Constitution Day (February 5). Thursday
before Easter. Good Friday. St. Joseph
(March 19). May 5. Ascension Day.
Corpus Christi. Assumption (August 15).
September 16. All Saints' Day (Novem-
ber 1). All Souls' Day (November 2).
Conception Day (December 8). Decem-
ber 12. Christmas Day.

MOROCCO.

January 7 (Aid Seghir). August 14 (Aid-el-
Kebir). September 13 (Ashora). Novem-
ber 13 (Mouloud) two days.

NEW ZEALAND (DUNEDIN).

January 1 and 2. Anniversary of the
Founding of the Province of Otago
(March 23). Good Friday. Easter
Monday. Anzac Day (April 25). Empire
Day (May 24). King's Birthday (June 3).
Arbor Day (date in August fixed by
Education Board). Labour Day (fourth
Monday in October). St. Andrew's Day
(November 30). Christmas Day (Decem-
ber 25). Boxing Day (December 26).

NEW ZEALAND (WELLINGTON).

New Year's Day. St. Patrick's Day
(March 17). Good Friday. Day after
Good Friday. Easter Monday. St.
George's Day (April 23). The Sovereign's
Birthday (June 3). Dominion Day (4th
Monday in September). Labour Day
(4th Monday in October). St. Andrew's
Day (November 30). Christmas Day.
Day after Christmas Day.

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES OF THE WORLD—continued.

NICARAGUA.

January 1, July 4 and 14, Holy Thursday,
Good Friday, September 14 and 15,
October 12, December 25.

NORWAY.

New Year's Day. Maundy Thursday.
Easter Day and Easter Monday. May 17
(half-holiday). Ascension Day. Whit
Sunday. Whit Monday. Pray Day,
November 4. Christmas Day and De-
cember 26.

PANAMA (CANAL ZONE).

New Year's Day. Washington's Birthday
(February 22). Good Friday. Decoration
Day (May 30). U.S. Independence Day
(July 4). Labour Day, First Monday in
September. Panama Independence Day
(November 3). Thanksgiving Day (last
Thursday in November). Christmas Day.
If a legal holiday fall on a Sunday, the
Monday following will be observed as a
legal holiday.

PANAMA (REPUBLIC OF).

January 1, New Year's Day. January 21,
Foundation of the City of Panama.
February 15, Signing of the Act of
Independence of Panama. Shrove
Tuesday, "Martes del Carnaval." Holy
Thursday. Good Friday. May 1, Labour
Day. July 4, Independence of the
United States. July 24, Birthday of
Simon Bolivar. October 1, every fourth
year—Inauguration of the New President
(half-day). October 12, Discovery of
America. November 3, Independence of
Panama from Colombia. November 28,
Independence from Spain. December 25,
Christmas Day.

PARAGUAY.

January 1, February 3, May 14 and 15.
August 15. October 12. November 25.
December 8 and 25.

PERU.

January 1 and 6. Shrove Monday and
Tuesday. Ash Wednesday (half-day).
March 19 (St. Joseph). Thursday and
Friday before Easter. Ascension Day.
Corpus Christi (movable). June 29.
July 28, 29 and 30. August 15 and 30.
September 24. October 12. November 1.
December 8 and 25.

PORTO RICO.

New Year's Day. February 22 (Washing-
ton's Birthday). March 22 (Abolition of
Slavery). Good Friday. May 30 (Decora-
tion Day). July 4 (Declaration of
Independence). July 25 (Day of Landing
of Americans). First Monday in Septem-
ber (Labour Day). October 12 (Columbus
Day). Last Thursday in November
(Thanksgiving Day). December 25
(Christmas Day).

PORTUGAL (LISBON).

January 1 and 31.
May 3.
June 10.
October 5.
December 1 and 25

RUMANIA.

January 7, 8 and 9 (Christmas Holidays).
January 14 (New Year's Day). January
19 (Epiphany). January 20 (St. John the
Baptist). February 6, National Holiday
(Union of Principalities). February 15
(Purification). March 27 (Proclamation
of Rumania as a Kingdom). April 7
(Annunciation Day). Easter Monday and
Tuesday (Greek). May 6 (St. George's
Day). May 23 (King's Coronation).
Ascension Day (Greek). June 3 (SS.
Constantine and Helen). Whit Monday
(Greek). July 12 (SS. Peter and Paul).
August 2 (St. Elias). August 19 (Trans-
figuration). August 28 (Assumption Day).
September 11 (Death of St. John the
Baptist). September 21 (Nativity of
B.V.M.). September 27 (Exaltation of the
Cross). November 8 (St. Demetrius).
November 21 (SS. Michael and Gabriel).
December 4 (Presentation). December 19
(St. Nicholas).
Dates given are New Style.

RUSSIA.

January 7 (Christmas Day). January 8
(2nd Christmas Day). January 9 (3rd
Christmas Day). January 14 (New Year's
Day). January 19 (Epiphany). February
15 (Purification). Carnival Day. Carnival
Second Day. April 7 (Annunciation of
Blessed Virgin Mary). Palm Sunday.
Thursday before Good Friday. Good
Friday. Easter Saturday. Easter
Monday. Easter Tuesday. Easter
Wednesday. Easter 6th Day. May 22,
St. Nicholas's Day. Ascension Day.
June 8, Holy Ghost Day. Whit Monday.
July 12, St. Peter and St. Paul. August
19, Transfiguration. August 28, Assump-
tion Blessed Virgin Mary. September 11,
Death of St. John the Baptist. Septem-
ber 12, St. Alexander Nevsky. Septem-
ber 21, Nativity of Blessed Virgin Mary.
September 27, Exaltation of Cross.
October 9, St. John the Evangelist.
October 14, Intercession of Blessed
Virgin Mary. November 4, Virgin of
Kazan. December 4, Presentation of
Blessed Virgin Mary.
Dates given are New Style.

SALVADOR.

January 1 and 6. March 1 and 15. Wednes-
day, Thursday, Friday and Saturday in
Holy Week. Ascension Day. June 22
and 29. July 14. August 5 and 6.
September 15 (Independence Day).
October 12, November 1 (All Saints) and
November 5. December 8, 24 and 25.

SANTO DOMINGO.

New Year's Day.
January 6.
Independence Day (February 27).
Corpus Christi.
August 16 (Spanish evacuation).
Las Mercedes (September 24).
Holy Week (Thursday and Friday).
Christmas Day.

SIAM.

King's Birthday (January 1).
New Year's Day (January 1).
Chinese New Year (two days).

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES OF THE WORLD—*continued.*

SIAM—*continued.*

Siamese New Year (April 1).
Easter (Friday to Monday).
May 24, June 9, July 1, July 14, August 4.
Memorial Day of King Rama V. (October 23).
Accession Day (November 11).
Christmas Day.
December 26.

SOUTH AFRICA.

New Year's Day.
Good Friday.
Easter Monday.
Empire Day (May 24).
Union Day (May 31).
Ascension Day.
First Monday in August.
First Monday in October.
Dingaan's Day (December 16).
Christmas Day.
Boxing Day.

SPAIN.

January 1, Circumcision. January 6,
Twelfth Night. March 19, St. Joseph.
Holy Thursday. Good Friday. Ascension
Day. June 3, Corpus Christi. June
29, SS. Peter and Paul. July 25, St. James.
August 15, Assumption. November 1,
All Saints' Day. December 8, Immaculate
Conception. December 25, Christmas
Day.

STRAITS SETTLEMENTS.

New Year's Day.
Chinese New Year (two days).
Taipusum (January 24).
Easter (three days).
Whit Monday.
King's Birthday.
Hari Raya Puaba (June 8).
July 30.
First Monday in August.
November 12 and 14.
Christmas (two days).
These days are usually holidays, the
following Monday being observed if
any fall on Sunday.
At Singapore (February 6) and Penang
(August 12) the Anniversaries of the
Settlements are also observed as holi-
days.

SWEDEN.

January 1. January 6.
Annunciation (March 25).
Good Friday.
Day before Easter Holidays.
Easter Monday.
May 1.
Ascension Day.
Day before Whit Sunday.
Whit Monday.
June 23 and 24.
December 24, 25, 26 and 31.

TASMANIA.

January 1, New Year's Day.
January 26 (Foundation of Australia
Anniversary).
Eight-Hour Day.
Good Friday.
Easter Monday.
The King's Birthday (June 3).
Prince of Wales's Birthday (June 23).
Day of Wharf Labourers' Union Picnic.

Christmas Day, December 25.

December 26.

When Anniversary Day or King's Birth-
day falls on any day but Monday, the
following Monday is observed instead,
and whenever Christmas Day falls on
Sunday the two days following are
Bank Holidays. When any other
holiday falls on Sunday the following
Monday is a Bank Holiday.

TRINIDAD.

January 1. Good Friday. Easter Monday.
Whit Monday. May 24 (Empire Day).
Corpus Christi. July 31. Discovery Day.
December 25 (Christmas Day).

TRIPOLI (BARBARY).

New Year's Day.
Epiphany (January 6).
Ascension Day (May 29).
August 15.
September 20.
All Saints' Day (November 1).
Christmas Day.

TURKEY.

January 1, New Year's Day, N.S.
January 7, Christmas Day, O.S.
January 14, New Year's Day, O.S.
January 19, Epiphany, O.S.
July 23, National Holiday.
August 15, Assumption, N.S.
August 28, Assumption, O.S.
November 1, All Saints' Day, N.S.
December 25, Christmas Day.
Bairam (one day).
Good Friday, N.S.
Easter Monday, N.S.
Holy Thursday, O.S.
Easter Monday, O.S.
Ascension, N.S. Ascension, O.S.
Pentecost, N.S. Pentecost, O.S.
Rosses (Jewish New Year's Day).
Pessah (Jewish Easter).
Kifour (Fête du Pardon).
Mevlud (Birthday of Mahomet).
Holy Gregory (Armenian Holiday).
Mahomet's Birthday.
Sheker-Bairam (3 days).
Courban-Bairam (4 days).

TURK'S ISLAND.

January 1. Good Friday. December 25
(Christmas Day).

UNITED STATES OF AMERICA.

January 1. New Year's Day: In all
States and District of Columbia, Porto
Rico, Hawaii, and Alaska, except
Massachusetts.
January 8. Anniversary of the Battle of
New Orleans: In Louisiana.
January 19. Lee's Birthday: In Alabama,
Arkansas, Florida, Georgia, North Caro-
lina, South Carolina, and Virginia.
February 12. Georgia Day: In Georgia.
February 12. Lincoln's Birthday: In
California, Colorado, Connecticut, Dela-
ware, Illinois, Indiana, Iowa, Kansas,
Kentucky, Michigan, Minnesota, Mon-
tana, Nebraska, Nevada, New Jersey,
New York, North Dakota, Oregon, Penn-
sylvania, South Dakota, Washington,
West Virginia, and Wyoming.

LIST OF OFFICIAL HOLIDAYS IN VARIOUS COUNTRIES OF THE WORLD—*continued.*

UNITED STATES OF AMERICA—*continued.*

February 14. Admission Day: In Arizona.

February 17. Mardi Gras, Shrove Tuesday: In Alabama and Florida (in counties having a carnival): in Louisiana, in the parishes of Orleans, St. Bernard, Jefferson, St. Charles, and St. John the Baptist.

February 22. Washington's Birthday: In all the States, District of Columbia, Porto Rico, Hawaii, and Alaska.

March 2. Anniversary of Texan Independence: In Texas.

March 4. Inauguration Day: In District of Columbia in years when a President of the United States is inaugurated.

March 22. Emancipation Day: In Porto Rico.

March 25. Maryland Day: In Maryland.

April 2. Good Friday: In Alabama, Connecticut, Delaware, Florida, Louisiana, Maryland, Minnesota, New Jersey, Pennsylvania, Porto Rico, Tennessee.

April 12. Halifax Independence Resolutions: In North Carolina.

April 13. Thomas Jefferson's Birthday: In Alabama.

April 19. Patriots' Day: In Maine and Massachusetts.

April 21. Anniversary of the Battle of San Jacinto: In Texas.

April 26. Confederate Memorial Day: In Alabama, Florida, Georgia, and Mississippi.

May 10. Confederate Memorial Day: In North Carolina and South Carolina.

May (Second Friday). Confederate Day: In Tennessee.

May 20. Anniversary of the Signing of the Mecklenburg Declaration of Independence: In North Carolina.

May 30. Decoration Day: In all the States and District of Columbia, Porto Rico, Hawaii, and Alaska, except Arkansas, Florida, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. Confederate Memorial Day: In Virginia.

June 3. Jefferson Davis's Birthday: In Alabama, Florida, Georgia, Mississippi, South Carolina, and Texas. In Louisiana, known as "Confederate Memorial Day."

June 11. Kamehameha Day: In Hawaii.

June 15. Pioneer Day: In Idaho.

July 4. Independence Day: In all the States, and District of Columbia, Porto Rico, Hawaii, and Alaska.

July 24. Pioneers' Day: In Utah.

July 25. Landing of American Troops: Porto Rico.

August 1. Colorado Day: In Colorado.

August 16. Bennington Battle Day: In Vermont.

September 3. Labour Day: In all the States and District of Columbia, Porto Rico, Hawaii and Alaska.

September (Third Saturday). Regatta Day: In Territory of Hawaii.

September 9. Admission Day: In California.

September 12. "Defenders' Day": In Maryland.

October (First Monday): Missouri Day (commemorative of Missouri history): In Missouri.

October (Second Friday). Farmers' Day: In Florida.

October 12. Columbus Day: In Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Porto Rico, Rhode Island, Texas, Vermont, Washington, West Virginia.

October 18. Alaska Day: In Alaska.

October 31. Admission Day: In Nevada.

November 1. All Saints' Day: In Louisiana.

November 6. General Election Day: In most of the States.

November (usually the last Thursday). Thanksgiving Day: Is observed in all the States and in the District of Columbia, Porto Rico, Hawaii, and Alaska, although it is not a statutory holiday in all.

December 25. Christmas Day: In all the States and the District of Columbia, Porto Rico, Hawaii and Alaska.

Arbor Day: In some of the States. The date is not uniform.

Saturday Afternoon: In many of the States and cities and District of Columbia.

Sundays and Fast days are legal holidays in all the States which designate them as such.

There is no National holiday, not even the Fourth of July. Congress has at various times appointed special holidays. In the second session of the Fifty-third Congress it passed an Act making Labour Day a public holiday in the District of Columbia, and it has recognised the existence of certain days as holidays for commercial purposes; but, with the exception named, there is no general statute on the subject. The proclamation of the President designating a day of Thanksgiving only makes it a legal holiday in the District of Columbia and the Territories.

URUGUAY.

January 1 and 6. February 3 and 28. April 19. May 1, 18 and 25. June 29. July 4, 14 and 18. August 15 and 25. September 20. October 12. November 1. December 8 and 25. Also Monday and Tuesday preceding Ash Wednesday (Carnival), and Thursday, Friday and Saturday in Holy Week.

VENEZUELA.

January 1. Holy Thursday and Good Friday. April 19. July 5. July 24.

DAYS IN VARIOUS COUNTRIES
WORLD—continued.

September 12. "Defenders' Day":
In Maryland.
October (First Monday): Missouri Day
(commemorative of Missouri history
in Missouri.
October (Second Friday). Farmers' Day:
In Florida.
October 12. Columbus Day: In Alaska,
Arizona, Arkansas, California, Colorado,
Connecticut, Delaware, Idaho, Illinois,
Indiana, Kansas, Kentucky, Michigan,
Maryland, Massachusetts, Minnesota, Missouri,
Montana, Nebraska, Nevada, New Hampshire,
New Jersey, New Mexico, New York, Ohio,
Oklahoma, Oregon, Pennsylvania, Porto Rico,
Rhode Island, Texas, Vermont, Washington, West Virginia.
October 18. Alaska Day: In Alaska.
October 31. Admission Day: In Nevada.
November 1. All Saints' Day: In Louisiana.
November 6. General Election Day: In most of the States.
November (usually the last Thursday):
Thanksgiving Day: Is observed in the States and in the District of Columbia,
Porto Rico, Hawaii, and Alaska, although it is not a statutory holiday in all.
December 25. Christmas Day: In all the States and the District of Columbia,
Porto Rico, Hawaii and Alaska.
Arbor Day: In some of the States. The date is not uniform.
Saturday Afternoon: In many of the States and cities and District of Columbia.
Sundays and Fast days are legal holidays in all the States which designate them as such.
There is no National holiday, not even the Fourth of July. Congress has at various times appointed special holidays. In the second session of the Fifty-third Congress it passed an Act making Labour Day a public holiday in the District of Columbia, and it has recognized the existence of certain days as holidays for commercial purposes; but with the exception named, there is no general statute on the subject. The proclamation of the President designating a day of Thanksgiving only makes it a legal holiday in the District of Columbia and the Territories.

JANUARY.
January 1 and 6. February 3 and 20.
April 19. May 1, 18 and 25. June 30.
July 4, 14 and 18. August 13 and 25.
September 20. October 12. November 1.
December 8 and 25. Also Monday and Tuesday preceding Ash Wednesday (carnival), and Thursday, Friday and Saturday in Holy Week.

DECEMBER.
January 1.
Thursday and Good Friday.
19.
5.
24.

1920 CALENDAR 1920

JANUARY	FEBRUARY	MARCH	APRIL
\$... 4 11 18 25 M ... 5 12 19 26 T ... 6 13 20 27 W ... 7 14 21 28 T ... 1 8 15 22 29 F ... 2 9 16 23 30 S ... 3 10 17 24 31	\$... 1 8 15 22 29 M ... 2 9 16 23 T ... 3 10 17 24 W ... 4 11 18 25 T ... 5 12 19 26 F ... 6 13 20 27 S ... 7 14 21 28	\$... 7 14 21 28 M ... 1 8 15 22 29 T ... 2 9 16 23 30 W ... 3 10 17 24 31 T ... 4 11 18 25 F ... 5 12 19 26 S ... 6 13 20 27	\$... 4 11 18 25 M ... 5 12 19 26 T ... 6 13 20 27 W ... 7 14 21 28 T ... 1 8 15 22 29 F ... 2 9 16 23 30 S ... 3 10 17 24 31
MAY	JUNE	JULY	AUGUST
\$... 2 9 16 23 30 M ... 3 10 17 24 31 T ... 4 11 18 25 W ... 5 12 19 26 T ... 6 13 20 27 F ... 7 14 21 28 S ... 1 8 15 22 29	\$... 6 13 20 27 M ... 7 14 21 28 T ... 1 8 15 22 29 W ... 2 9 16 23 30 T ... 3 10 17 24 F ... 4 11 18 25 S ... 5 12 19 26	\$... 4 11 18 25 M ... 5 12 19 26 T ... 6 13 20 27 W ... 7 14 21 28 T ... 1 8 15 22 29 F ... 2 9 16 23 30 S ... 3 10 17 24 31	\$... 1 8 15 22 M ... 2 9 16 23 T ... 3 10 17 24 W ... 4 11 18 25 T ... 5 12 19 26 F ... 6 13 20 27 S ... 7 14 21 28
SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
\$... 5 12 19 26 M ... 6 13 20 27 T ... 7 14 21 28 W ... 1 8 15 22 29 T ... 2 9 16 23 30 F ... 3 10 17 24 S ... 4 11 18 25	\$... 3 10 17 24 31 M ... 4 11 18 25 T ... 5 12 19 26 W ... 6 13 20 27 T ... 7 14 21 28 F ... 1 8 15 22 29 S ... 2 9 16 23 30	\$... 7 14 21 28 M ... 1 8 15 22 29 T ... 2 9 16 23 30 W ... 3 10 17 24 T ... 4 11 18 25 F ... 5 12 19 26 S ... 6 13 20 27	\$... 5 12 19 26 M ... 6 13 20 27 T ... 7 14 21 28 W ... 1 8 15 22 29 T ... 2 9 16 23 30 F ... 3 10 17 24 31 S ... 4 11 18 25

1922 CALENDAR 1922

JANUARY	FEBRUARY	MARCH	APRIL
\$... 1 8 15 22 29 M ... 2 9 16 23 30 T ... 3 10 17 24 31 W ... 4 11 18 25 T ... 5 12 19 26 F ... 6 13 20 27 S ... 7 14 21 28	\$... 5 12 19 26 M ... 6 13 20 27 T ... 7 14 21 28 W ... 1 8 15 22 29 T ... 2 9 16 23 30 F ... 3 10 17 24 S ... 4 11 18 25	\$... 5 12 19 26 M ... 6 13 20 27 T ... 7 14 21 28 W ... 1 8 15 22 29 T ... 2 9 16 23 30 F ... 3 10 17 24 31 S ... 4 11 18 25	\$... 2 9 16 23 30 M ... 3 10 17 24 31 T ... 4 11 18 25 W ... 5 12 19 26 T ... 6 13 20 27 F ... 7 14 21 28 S ... 1 8 15 22 29
MAY	JUNE	JULY	AUGUST
\$... 7 14 21 28 M ... 1 8 15 22 29 T ... 2 9 16 23 30 W ... 3 10 17 24 31 T ... 4 11 18 25 F ... 5 12 19 26 S ... 6 13 20 27	\$... 4 11 18 25 M ... 5 12 19 26 T ... 6 13 20 27 W ... 7 14 21 28 T ... 1 8 15 22 29 F ... 2 9 16 23 30 S ... 3 10 17 24	\$... 2 9 16 23 30 M ... 3 10 17 24 31 T ... 4 11 18 25 W ... 5 12 19 26 T ... 6 13 20 27 F ... 7 14 21 28 S ... 1 8 15 22 29	\$... 6 13 20 27 M ... 7 14 21 28 T ... 1 8 15 22 29 W ... 2 9 16 23 30 T ... 3 10 17 24 31 F ... 4 11 18 25 S ... 5 12 19 26
SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
\$... 3 10 17 24 M ... 4 11 18 25 T ... 5 12 19 26 W ... 6 13 20 27 T ... 7 14 21 28 F ... 1 8 15 22 29 S ... 2 9 16 23 30	\$... 1 8 15 22 29 M ... 2 9 16 23 30 T ... 3 10 17 24 31 W ... 4 11 18 25 T ... 5 12 19 26 F ... 6 13 20 27 S ... 7 14 21 28	\$... 5 12 19 26 M ... 6 13 20 27 T ... 7 14 21 28 W ... 1 8 15 22 29 T ... 2 9 16 23 30 F ... 3 10 17 24 S ... 4 11 18 25	\$... 3 10 17 24 31 M ... 4 11 18 25 T ... 5 12 19 26 W ... 6 13 20 27 T ... 7 14 21 28 F ... 1 8 15 22 29 S ... 2 9 16 23 30

**RECORD-OF
WIRELESS
DEVELOPMENT**

**Years 1827—1920
inclusive.**

RECORD OF THE DEVELOPMENT OF WIRELESS TELEGRAPHY AND TELE- PHONY, AND INTERESTING ITEMS IN CONNECTION THEREWITH

The record below is intended to constitute a résumé, arranged in chronological order, of the outstanding events in wireless telegraphy from year to year.

This is a feature which has figured in our YEAR BOOK from its initiation in 1913. The record for the past year will be found in an extended form at the end of this section.

1827.

SAVARY found that a steel needle could be magnetised by the discharge from a leyden-jar.

1831.

Michael Faraday discovered electro-magnetic induction between two entirely separate circuits.

1837.

The first patent for an electric telegraph was taken out by Cooke and Wheatstone (London) and by Morse (U.S.A.).

1838.

K. A. Steinheil (Munich) discovered the use of the earth return, and suggested that the remaining metallic portion of the circuit might be dispensed with entirely, and a system of wireless telegraphy established.

1840.

Joseph Henry (U.S.A.) first produced high-frequency electric oscillations, and pointed out that the discharge of a condenser is oscillatory.

1842.

S. F. B. Morse made wireless experiments by electric conduction through water across Washington Canal and across wide rivers.

Joseph Henry noticed that the effect of a single electric spark about one inch long occurring in a circuit in an upper room was to magnetise steel needles included in another circuit placed in a cellar thirty feet below with two floors intervening. He was one of many observers prior to Hertz who had noticed curious effects due to electric sparks produced at a distance, which were commonly ascribed to ordinary electro-magnetic induction.

1843.

James Bowman Lindsay, of Dundee, suggested that if it were possible to provide stations not more than twenty miles apart all the way across the Atlantic, there would be no need to lay any cable.

1845.

Lindsay began making experiments across the River Tay, his method being to transmit messages by means of electricity or magnetism through and across the water without submerged wires, the water being utilised as the conducting medium.

1849.

Dr. O'Shaughnessy (afterwards Sir William O'Shaughnessy Brooke) succeeded in passing intelligible signals without any metallic conduction across the River Hooghly, 4,200 ft. wide, in India, but he found the cost of power prohibitive.

1859.

Bowman Lindsay gave a demonstration of his conduction system to the British Association Meeting, at which Michael Faraday and Sir William Thomson (afterwards Lord Kelvin) were both present. William H. Preece (afterwards Sir William) was deputed by the Electric Telegraph Company to report on Lindsay's system.

1862.

John Heyworth patented a method of conveying electric signals without the intervention of any continuous artificial conductor. Cromwell Varley tried this method, but found it a failure.

1867.

James Clerk Maxwell read a paper before the Royal Society, in which he laid down the theory of electro-magnetism, which he developed more fully in 1873, in his great treatise on electricity and magnetism. He predicted the existence of the electric waves that are now used in wireless telegraphy.

1870.

Von Bezold discovered that oscillations set up by a condenser discharge in a conductor give rise to interference phenomena.

1872.

Henry Highton made various experiments across the River Thames with Morse's method.

1879.

David E. Hughes discovered the phenomena on which depend the action of what was subsequently known as the coherer. These phenomena many years later were used in early electric-wave signalling. He found that a tube of metallic filings was sensitive to electric sparks made in its vicinity, and he was able to obtain such effects on a tube connected to a battery and a telephone at a distance of five hundred yards.

1880.

John Trowbridge, of Harvard, systematically studied the problem of propagation of electric current through "earth," either soil or water, and he found that signalling might be carried on over considerable distances by electric conduction through the earth or water between places not metallically connected.

1882.

Graham Bell experimented with Trowbridge's method on the Potomac River, when signals were detected at a distance of $1\frac{1}{4}$ miles.

Sir William H. Preece made an experiment, using Morse's method, to connect the Isle of Wight with the mainland across the Solent on two occasions during the failure of the submarine cable in the Solent.

1883.

Willoughby Smith, in a paper before the Institution of Civil Engineers, London, suggested that electric induction might be employed for railway signalling.

Heinrich Rudolph Hertz became *privat docent* at Kiel, where he began studies in Maxwell's electro-magnetic theory.

G. F. Fitzgerald suggested a method of producing electro-magnetic waves in space by the discharge of a condenser.

1885.

Thomas A. Edison, with the assistance of Messrs. Gilliland, Phelps, and W. Smith, worked out a system of communication between railway stations and moving trains by means of induction and without the use of conducting wires.

Sir W. H. Preece made experiments at Newcastle-on-Tyne which showed that in two completely insulated circuits of square form, each side being 440 yards, placed a quarter of a mile apart, telephonic speech was conveyed from one to the other by induction.

1886.

A. E. Dolbear, of Tuft's College, Boston, patented a plan for establishing wireless communication by means of two insulated elevated plates, but there is no evidence that the method proposed by him did, or could, effect the transmission of signals between stations separated by any distance.

1887.

Heinrich Rudolph Hertz discovered the progressive propagation of electro-magnetic action through space, and was able to measure the length and velocity of electro-magnetic waves, and to show that in the transverse nature of their vibration, and their susceptibility to refraction and polarisation, they are in complete accordance with the waves of light and heat.

Hertz employed as a detector of the electric wave a simple nearly closed circuit of wire, called the "Hertz Resonator," but it was subsequently discovered that the metallic microphone of Hughes was a far more sensitive detector.

A. W. Heaviside established communication by telephonic speech between the surface of the earth and the subterranean galleries of the Broomhill Collieries, 350 ft. deep, by laying above and below ground two complete metallic circuits, each about $2\frac{1}{4}$ miles in length, and parallel to each other.

1889.

Elihu Thompson suggested that electric waves were particularly suitable for the transmission of signals through fogs and material objects.

1891.

John Trowbridge suggested that by means of magnetic induction between two separate and completely insulated circuits communication could be effected between distances.

1892.

Edouard Branly devised an appliance for detecting electro-magnetic waves, which was known as a "coherer." He discovered that these waves had the power of affecting the electric conductivity of materials when in the state of a powder.

Sir W. H. Preece adopted a method which united both conduction and

induction as the means of affecting one circuit by the current in another, in this way he established communication between two points on the Great Eastern Railway Channel, and at Lochness, in Scotland.

C. A. Stevenson, of the Northern Lighthouse Board, Edinburgh, adopted the use of an inductive system for communication between the main and isolated lighthouses.

1894.

E. Rathenau, of Berlin, experimented with a conductive system for wireless telegraphy, and signalled through three miles of water.

1895.

Senatore G. Marconi's investigations led him to the conclusion that electrical actions and manifestations could be transmitted through the air, or water by means of electrical oscillations of high frequency ; in consequence he made important experiments at his father's home in Italy.

Willoughby Smith established communication by conduction with a lighthouse on the Fastnet.

1896.

On February 2nd Senatore Marconi came to England, and on June 1st lodged his application for the first British Patent for Wireless Telegraphy, No. 12,039 of 1896.

In July of that year he was introduced to Sir William H. Preece, Chief Electrical Engineer of the Post Office, at whose request Senatore Marconi conducted experiments over a distance of about 100 yards before the officials of the Post Office. Shortly afterwards a further series of trials were conducted by Senatore Marconi on Salisbury Plain, when communication was successfully established over a distance of $1\frac{1}{2}$ miles.

On July 27th the first demonstration of directional wireless, using reflectors, was given on the roof of the G.P.O., London.

On September 3rd experiments were conducted to determine the relative speed of propagation of light waves and the electric vibrations which act as a receiver at a distance of $1\frac{1}{2}$ miles between reflectors.

On December 12th Sir William H. Preece lectured on Senatore Marconi's invention at Toynbee Hall, the inventor himself conducting the experiments.

1897.

In March, 1897, Senatore Marconi demonstrated before the representatives of various Government Departments, communication being established over a distance of 4 miles.

On March 17th balloons were first used for the suspension of wireless aërials.

In May further trials were made between Lavernock and Flatholm, over a distance of over three miles ; and on the 13th of that month the late Professor Slaby was present at further trials, when communication was established over a distance of about 8 miles.

In July, Senatore Marconi gave a demonstration of his invention at the Admiralty in Rome, and before King Humbert at the Royal Palace of the Quirinal. Between July 10th and 18th trials were made at Spezia, and the 17th and 18th communication was maintained between the shore and the Italian cruiser *San Martin* at sea, at distances up to 10 miles.

On July 20th, 1897, the Wireless Telegraph and Signal Company Limited, was incorporated, with a capital of £100,000, to acquire Senatore Marconi's patents in all countries except Italy and dependencies.

On August 27th Professor Slaby lectured on Wireless Telegraphy at the Sailors' Home, Potsdam, before the German Emperor and Empress and the King of Spain.

In September and October Senatore Marconi further experimented on Salisbury Plain. Trials were also made at Dover by officials of the Post Office. Apparatus was erected at Bath, and signals received from Salisbury, 34 miles away.

The first Marconi station was erected at the Needles, Isle of Wight, in November, and experiments conducted between that station and Bournemouth, a distance of $14\frac{1}{2}$ miles.

On December 6th, in the presence of Captain Kennedy, R.E., tests were made between the Needles station and a steamer, readable signals being received up to a distance of 18 miles.

On December 7th the first floating wireless station was completed. It was operated by Senatore Marconi for developing the first two land stations on the Solent.

1898.

In May, 1898, Senatore Marconi experimented between St. Thomas's Hospital and the House of Commons. In the same month experiments were carried out between Ballycastle and Rathlin Island, a distance of $7\frac{1}{2}$ miles.

On June 3rd Lord Kelvin visited the Needles station and sent from there the first paid marconigram.

On July 20th and 22nd the events of the Kingstown Regatta were reported by wireless telegraphy, for the *Dublin Daily Express*, from the steamer *Flying Huntress*, equipped with Marconi apparatus.

On August 3rd wireless telegraphic communication was established between the Royal yacht *Osborne* and Ladywood Cottage, Osborne, in order that Queen Victoria might communicate with the then Prince of Wales. Constant and uninterrupted communication was maintained during the sixteen days the system was in use.

On August 26th wireless messages were successfully transmitted through fog from Rathlin lighthouse.

In September the installation at Bournemouth was removed to Poole Harbour, Dorset.

By arrangement with Trinity House, wireless apparatus was installed in December, 1898, on the East Goodwin Lightship and at the South Foreland Lighthouse, the intervening distance being 12 miles.

1899.

During a gale in January, 1899, the East Goodwin Lightship was damaged and the mishap reported by wireless telegraphy to Trinity House.

On March 2nd Senatore Marconi read a paper on Wireless Telegraphy at the Institution of Electrical Engineers.

On March 3rd the s.s. *R. F. Matthews* ran into the East Goodwin Lightship. The accident was reported by wireless telegraphy to the South Foreland Lighthouse, and assistance was promptly sent.

On March 27th communication was established between Wimereux, near Boulogne, and the South Foreland Lighthouse.

On April 22nd the first French gun-boat was fitted with wireless telegraph apparatus at Boulogne.

The first wireless station at Chelmsford was finished on June 1st, and this was closely followed by the first wireless station at Dovercourt, which was finished and communicated with Chelmsford station on July 13th.

On July 14th Prof. Tuma established wireless communication between two balloons at Vienna.

During the naval manoeuvres in July three British warships, equipped with Marconi apparatus, interchanged messages at distances up to 74 nautical miles (about 85 land miles).

During the meetings of the British Association at Dover and of the Association Française pour l'Avancement de Science at Boulogne, in August, communication was maintained by means of apparatus installed at the Dover Town Hall and at Wimereux.

The international yacht races which took place in September and October were reported by wireless telegraphy for the *New York Herald*. At the conclusion of the races, series of trials were made between the United States cruiser *New York* and the battleship *Massachusetts*, signals being exchanged between the vessels at distances up to about 36 miles. On the return journey from America Senatore Marconi fitted the s.s. *St. Paul* with his apparatus, and on November 15th established communication with the Needles Station when 36 miles away. Reports of the progress of the war in South Africa were telegraphed to the vessel, and published in a leaflet entitled *The Transatlantic Times*, printed on board.

In October the War Office adopted Marconi apparatus for use in the field in South Africa, and on November 2nd six electricians left for South Africa with sets of apparatus. These proved of considerable service to the Army and the Navy, to which latter they were subsequently transferred.

On November 22nd the Marconi Wireless Telegraph Company of America was formed for the purpose of exploiting Marconi patents in the United States of America and possessions.

1900.

On February 2nd Senatore Marconi delivered a discourse on "Wireless Telegraphy" at the Royal Institution.

On February 18th the first German commercial wireless station (Nord-deutsche Lloyd Steamship Company) on Borkum Island was opened.

On February 28th the first German liner (*Kaiser Wilhelm der Grosse*) fitted with wireless apparatus communicated with Borkum Island over a range of 60 miles.

On April 25th the Marconi International Marine Communication Company was incorporated, with offices in London and Brussels, and agencies in Paris and Rome, for the maritime working of the Marconi system. On April 26th Senatore Marconi took out his important patent, No. 7,777, upon which all modern development is based, and which is commonly referred to as the "four sevens patent."

On July 4th a contract was made with the British Admiralty for the installation of apparatus on twenty-six of His Majesty's ships and six Admiralty coast stations.

In October the erection of the High Power Station at Poldhu was commenced, the engine-house being built in this year—viz., 1900.

The first wireless land station in Belgium was finished at La Panne on November 2nd, 1900.

The *Princesse Clémentine* was fitted with wireless telegraphy on November 3rd, 1900, and communication established with La Panne and maintained the whole way from Ostend to Dover.

1901.

On January 1st the barque *Medora* was reported by wireless as water-logged on Ratel Bank. Assistance was immediately sent.

On January 19th the *Princesse Clémentine* ran ashore, and news of the accident was telegraphed to Ostend by wireless.

On January 22nd the wireless station at the Lizard was finished.

On February 11th communication was established between Niton Station, Isle of Wight, and the Lizard Station, a distance of 196 miles.

On February 14th the construction of transmitting and receiving plant and the aerial of the Poldhu Transatlantic station was commenced.

On March 1st a public Wireless Telegraph Service was inaugurated between the five principal islands of the Hawaiian group—viz., Oahu, Kauai, Molaki, Maui and Hawaii.

In April communication was successfully established and maintained between a station at Calvi, Corsica, and another at Antibes, in the Riviera.

On May 15th, 1901, Senatore Marconi read a paper on Syntonic Wireless Telegraphy at the Royal Society of Arts, London.

The first British ship, the s.s. *Lake Champlain*, was equipped with wireless telegraphic apparatus on May 21st. About the same date coast stations in England and Ireland were opened for communication with ships at, sea as follows:—Crookhaven, Co. Cork; Rosslare, Co. Wexford; Holyhead; Caister, near Yarmouth; North Foreland.

The masts at Poldhu were wrecked during a very heavy gale on September 20th, and the masts at Cape Cod shared a like fate in the November following. The masts were then replaced by four towers, 210 ft. high, built of timber.

On September 26th a 14 years' contract was made for the installation of wireless apparatus at ten of Lloyd's Signal Stations.

On October 15th the first fan aërials were erected for experiments between Poldhu and Newfoundland.

The Compagnie de Télégraphie sans Fil of Brussels was formed on October 26th, to develop and work the Marconi system on the Continent.

On December 12th and 13th signals were received by Senatore Marconi at St. John's, Newfoundland, from Poldhu station, Cornwall, a distance of 1,800 miles.

1902.

In February Senatore Marconi received on board the s.s. *Philadelphia* readable messages up to a distance of 1,551 statute miles, and signals up to a distance of 2,099 statute miles from Poldhu Station, Cornwall.

Senatore Marconi gave the first wireless demonstration in Scotland on May 6th at Dundee, and lectured on the "Progress of Electric Space Telegraphy" at the Royal Institution of Great Britain on June 13th.

On June 25th the first moving wire magnetic detector actuated by clockwork was installed on the Italian cruiser *Carlo Alberto*.

On July 14th-16th Senatore Marconi received messages from Poldhu on the Italian battleship *Carlo Alberto*, lying at Cape Skagen, a distance of 800 miles; and at Kronstadt, 1,600 miles.

The Colonial Premiers who were in England for King Edward's coronation witnessed a demonstration of Senatore Marconi's invention on board the *Koh-i-noor*.

On October 19th the cruiser *Carlo Alberto* left Plymouth for long distance experiments.

The Marconi Wireless Telegraph Company of Canada was formed on November 1st. On December 17th the first wireless message was transmitted across the Atlantic. On December 18th wireless messages were despatched by Senatore Marconi and the Earl Minto from the Cape Breton Station to His Majesty King Edward VII. Senatore Marconi also sent a message to King Victor of Italy. Senatore Marconi was made a member of the Italian Order of Merit.

1903.

President Roosevelt sent a Transatlantic message to King Edward VII via Cape Cod and Poldhu Stations on January 18th. High-power and other stations were ordered by the Italian Government, and the Italian Senate and Chamber of Deputies tendered a vote of thanks to Senatore Marconi for the results obtained with wireless telegraphy.

The first Transatlantic marconigram was published in *The Times* on March 30th.

On April 5th the first licence for the erection of an Italian high-power station was granted.

The Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil was formed on April 24th to exploit the Marconi system in France.

An agreement was made on July 24th by the British Admiralty for the general use of the Marconi system in the Navy.

The first International Conference on Wireless Telegraphy was held in Berlin on August 4th.

On August 22nd a wireless telegraphic service of news to ships at sea was inaugurated.

The passengers of the Red Star liner *Kroonland*, which was disabled on December 8th, 130 miles west of the Fastnet, were saved great inconvenience by wireless communication being established with the Crookhaven Station.

Senatore Marconi was made a knight of the Order of St. Anne of Russia.

1904.

On January 12th the first wireless message was exchanged between the Army and Navy.

On January 20th the first Press message was transmitted across the Atlantic.

Meteorological information was supplied by wireless to the *Daily Telegraph*.

Accidents to s.s. *New York* and s.s. *Friesland* early in the year were reported by wireless telegraphy.

On August 15th the Wireless Telegraph Act of Great Britain was passed.

On August 22nd the Wireless News Message Service to liners was inaugurated.

On November 16th Dr. J. Ambrose Fleming took out his original patent, No. 24,850, for thermionic valves.

1905.

On January 1st ships' messages were accepted at British Post Offices.

Judgment was given by Judge Townsend in New York on May 4th in favour of the Marconi Company in its action against the De Forest Wireless Telegraph Company for infringement of patents.

On May 12th the Canadian Government ordered stations for Cape Sable (N.S.) and St. John (N.B.), and on May 30th instructions were given by Trinity House for five more lightships to be installed with wireless apparatus.

On September 4th the first demonstration was given of long distance wireless reception with an open oscillating circuit stretched along the ground.

Erection of the Clifden High-Power Station (Ireland) was commenced in October.

Senatore Marconi was made a Civil Member of the Royal Order of Savoy.

In 1905 Senatore Marconi took out his patent for the horizontal directional aerial (No. 14,788), which marked a step of great importance in the progress of long-distance work.

1906.

On March 23rd the first high-power directional aerial was used at Clifden.

In May a contract was entered into between the British Post Office and the Marconi Company whereby the latter was charged with the erection of wireless stations at Tobermory and Loch Boisdale, Scotland.

On August 4th the Argentine Marconi Company was formed to work Marconi patents in Argentina and Uruguay.

In October and November an International Radiotelegraphic Conference was held at Berlin, and a convention signed by most of the countries of the world.

On December 29th the first experiments with the Marconi high-speed disc discharger were carried out.

1907.

On February 8th successful tests were made of the use of steel discs for producing notes.

Marconi Transatlantic Stations at Clifden, Ireland, and Glace Bay (Nova Scotia) were opened for limited public service on October 17th.

1908.

On February 3rd transatlantic stations were opened to the general public for transmission of messages between the United Kingdom and the principal towns in Canada.

Senatore Marconi lectured on "The Commercial Application of Wireless Telegraphy" at Liverpool on February 24th.

The Russian Company of Wireless Telegraphs and Telephones was formed on October 8th.

1909.

The *Republic*, after collision with the s.s. *Florida* off the coast of the United States on January 23rd, succeeded in calling assistance by wireless, with the result that all her passengers and crew were saved before the vessel sank.

Senatore Marconi lectured before the Dutch Royal Institute of Engineers in May and in December.

The Marconi British coast stations were taken over by the Postmaster-General on September 29th, who was granted a licence to use the company's patents.

In December Senatore Marconi lectured at the Royal Academy of Science, Stockholm, and (with Prof. Braun) was awarded the Nobel Prize for Physics.

1910.

On February 7th the first Wireless Shipping Report was published at Lloyd's.

Senatore Marconi, *en route* for Buenos Aires on board the *Principessa Mafalda*, received messages from Clifden at a distance of 4,000 miles by day and 6,735 miles by night.

On April 23rd the Marconi Transatlantic (Europe-America) Service was opened.

The Compania Nacional de Telegrafia sin Hilos was formed on December 24th to exploit the Marconi system in Spain.

1911.

On February 21st judgment was given in the action instituted in December, 1910, by the Marconi Company against the British Radiotelegraph and Telephone Company for infringement of their tuning patent No. 7777 of 1900. Mr. Justice Parker's decision was in favour of the Marconi Company, and he granted them a certificate of validity of their patent and an injunction, together with costs and damages.

A contract was made between the Marconi Company and the Canadian Government for operating wireless telegraph stations in Canada for a period of 20 years.

Stations at Teneriffe, Cadiz, Barcelona, and Las Palmas were opened for public business by the Compania Nacional de Telegrafia sin Hilos, the *concessionnaires* of the public wireless telegraph service of Spain.

The Imperial Conference held in May approved the proposal that an Imperial Wireless Telegraph system should be created.

Senatore Marconi lectured on "Radiotelegraphy" at the Royal Institution on June 2nd.

The Lodge-Muirhead patents were acquired by the Marconi Company, and Sir Oliver Lodge became a scientific adviser to the Company.

1912.

Early in the year the American Marconi Company absorbed the United Wireless Company of the United States.

On January 27th the central station of the Spanish wireless service (Aranjuez) was opened by King Alfonso XIII.

In February the Marconi Company secured the patents of Bellini and Tosi, including those for the wireless direction-finder.

On February 9th the first Australian Commonwealth Station was opened.

On April 15th the s.s. *Titanic* struck an iceberg and sank, but, owing to the prompt wireless call for assistance, the lives of more than 700 of her passengers were saved.

Senatore Marconi, whilst in America, delivered an address on the "Progress of Wireless Telegraphy" before the New York Electrical Society, on April 17th.

The International Radiotelegraphic Conference, opened in London on June 4th, approved important regulations to secure uniformity of practice in wireless telegraphic services.

On July 5th the International Radiotelegraphic Convention was signed at London.

The British Government entered into a contract in July with the Marconi Company for the erection of a chain of high-power Wireless Telegraph stations, as recommended at the Imperial Conference held in 1911.

The Marconi Wireless Telegraph Company of Canada was entrusted by the Dominion Government on September 17th with the working of the existing stations on the Great Lakes until 1931, and also with the erection of further stations. A similar arrangement was made in December with the Newfoundland Government for stations at Belle Isle, and on the Labrador coast.

Senatore Marconi was decorated with the Grand Cross of the Order of Alfonso XII, and made a Grand Officer of the Order of St. Maurice and Lazarus.

1913.

During this year the Governments of France and the United States experimented between the Eiffel Tower station and Washington by wireless, to secure data for comparing the velocity of electro-magnetic waves with that of light.

In January the High Court of Justice of France delivered a judgment declaring the validity of all claims of the Marconi patent 305060, which corresponds with the "four sevens" patent.

On January 23rd the Postmaster-General appointed a committee "To consider and report on the merits of the existing systems of long-distance wireless telegraphy, and in particular as to their capacity for continuous communication for the distances required by the Imperial Chain." The committee reported that "The Marconi system is at present the only system of which it can be said with any certainty that it is capable of fulfilling the requirements of the Imperial Chain."

As a result of the official enquiry into the loss of the *Titanic*, the *Scotia*, equipped with a Marconi wireless installation, left Dundee on March 8th to patrol the waters of the North Atlantic and to collect information regarding the movement of ice.

In June a Wireless Telegraph Bill was presented to the Ottawa Parliament, and passed under the title: "Radiotelegraph Act of Canada."

On October 11th the *Volturmo* was burnt in mid-Atlantic, and in response to the wireless appeal ten vessels came to the rescue, 521 lives being saved.

The Wireless Society of London was formed in October.

On November 12th an International Conference for the purpose of considering means of saving life at sea was opened in London by the President of the Board of Trade.

On November 24th the first practical trials with wireless apparatus on trains were made on a train belonging to the Delaware, Lackawanna and Western Railroad of America.

On November 25th Commander H. A. Edwards, who was at the head of the Bolivian Survey Commission, reported that the Commission had been able to determine the difference of longitude between the Brazilian towns Mañaos and Porto Velho by means of wireless signals.

Dr. Mawson, whilst exploring in Antarctica, was enabled by means of wireless to keep in touch with the outer world through the station on Macquarie Island.

During his expedition to Central Asia Dr. Filippo de Filippi, the Italian explorer, frequently determined his longitude by means of wireless time signals transmitted from Lahore.

1914.

On January 20th the Safety of Life at Sea Convention, drawn up by the International Conference which met on November 14th, 1913, was signed at London. That section of the Convention which deals with Wireless Telegraphy lays down the minimum wireless telegraphy equipment to be carried by vessels of different grades.

Early in the year an International Wireless Conference met at Brussels. The object of the Conference was to adopt a programme whereby careful observations could be taken with a view to arriving at some practical explanation of the laws governing the variation in the strength of wireless signals.

During the early part of March Senatore Marconi joined one of the Italian war vessels attached to the squadron commanded by the Duke of Abruzzi. Experiments in wireless telephony were carried out between several vessels lying at anchor $\frac{1}{2}$ mile apart, ordinary receivers being used with great success. The wireless telephone experiments were continued between two warships on the high seas, and the reception was consistently good over a distance of $18\frac{1}{2}$ miles. Successful wireless telephone communications were effected later, using only very limited energy between vessels on the high seas 70 km. (44 miles) apart. These experiments were repeated where land intervened between the communicating vessels, and in this case again excellent results were obtained. On this day radiotelephonic communication was constantly maintained for twelve hours.

This year saw the first practical application of wireless to lifeboats belonging to large ocean steamships, the Marconi Company having designed a special type of apparatus for this purpose.

On April 12th the Council of the Royal Society of Arts presented the Society's Albert Medal to Senatore Marconi for his services in the development and practical application of wireless telegraphy.

On April 15th, at Godalming, a memorial was unveiled to the memory of Jack Phillips, chief wireless telegraphist of the ill-fated *Titanic*, who "died at his post when the vessel foundered in mid-Atlantic on the 15th day of April, 1912."

On June 8th a report was issued by the committee appointed by the Postmaster-General to consider how far and by what methods the State should make provision for research work in Wireless Telegraphy. This report recommends (1) that the Government should establish a National Committee for Telegraphic Research which would promote in the public interest, both by theoretical investigation and by experiment, the progress of telegraphy and telephony, and (2) that the Government should establish a National Research Laboratory, with a special scientific staff to undertake, under the direction of the committee, and on the lines laid down in this report, telegraphic investigation, the results of which should be available for all departments of the public service.

In June important tests were made with the Marconi-Bellini-Tosi wireless direction finder on board the s.s. *Royal George*. During a voyage from Bristol to Montreal the liner, even in the thickest weather and without the aid of compass or sextant, was enabled to find her position when within a radius of about fifty miles of a land wireless station.

On July 24th the King conferred upon Senatore Marconi the Honorary Knighthood of the Grand Cross of the Victorian Order.

On July 24th judgment for plaintiffs was delivered in an action brought by the Marconi Company against the Helsby Wireless Telegraph Company, Limited, for infringement of patent 7777 of 1900.

War was declared on Germany by Great Britain on August 4th, and all *private* radiotelegraphy was suspended.

On August 9th the wireless station at Dar-es-Salaam, German East Africa, was announced to have been destroyed by the British.

The German station at Yap, Caroline Islands, was destroyed on August 12th.

On August 24th the Germans blew up the giant station at Kamina, Togoland, to prevent its falling into the hands of the British.

On August 24th the United States Government notified the owners of the German Transatlantic station at Tuckerton, New Jersey, that its experimental licence had expired, and it must therefore close down. Arrangements were afterwards made for restricted working.

On August 29th the German wireless station at Samoa was captured by an Australian Naval Force.

The German station at Nauru, Marshall Islands, was captured shortly after this.

On September 12th an Australian Naval Reserve Force captured the German wireless station at Herbertshohe on the island of Neu Pommern.

The powerful German station at Duala, Cameroons, was seized on September 27th.

On November 9th a Japanese force occupied Kiauchau and its wireless station.

On November 13th the Marconi Wireless Telegraph Company of America obtained a preliminary injunction against the De Forest Radio Telephone and Telegraph Company and the Standard Oil Company in a suit for infringement of patent.

On November 28th the following notice, under the Defence of the Realm (Consolidation) Regulations 1914, was issued: "No person shall, without the written permission of the Postmaster-General, buy, sell, or have in his possession or under his control any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus."

During the year high-power trans-oceanic stations were completed at Carnarvon (Wales), Belmar, New Jersey (U.S.A.), Honolulu (Hawaiian Islands), and San Francisco (Cal.). The Honolulu and San Francisco stations were formally opened to public service on September 24th.

1915.

In January Senatore Marconi took his seat in the Italian Senate.

On February 20th the Panama-Pacific Exhibition at San Francisco was officially opened by President Wilson at Washington, through the medium of wireless telegraphy.

A wireless telegraph service between Spain and Italy was inaugurated on May 1st.

On May 12th the German high-power wireless station at Windhoek was captured by a South African force.

On May 12th, in Battery Park, New York, the Mayor of New York unveiled the monument in memory of wireless operators who had lost their lives at the post of duty.

On July 8th, as a result of investigations into alleged breaches of neutrality, the United States Government decided to take over the control of the Telefunken wireless station at Sayville, Long Island.

At the annual meeting of Marconi's Wireless Telegraph Company on July 26th Mr. Godfrey Isaacs announced the complete disruption of the German wireless chain, upon which our late enemy had expended so much money, and on which they based their high hopes of a commercial world-domination.

On July 27th wireless communication between the United States and Japan was effected. The two terminal stations were situated at San Francisco and Funabashi, near Tokio, and the messages were relayed through Honolulu.

On July 28th communication was obtained between Arlington and Hawaii by wireless telephony.

At the end of August the submarine cable between Oban and south-east Mull broke, and until its repair wireless telegraphy formed the only means of communication between the outlying islands and the mainland.

On September 28th the American Telephone and Telegraph Company, working in conjunction with the Western Electric Company, succeeded in telephoning by wireless across the American Continent from Arlington to Hawaii, a distance of nearly 5,000 miles.

In September a commercial wireless service was inaugurated between Japan and foreign countries *via* Ochūshi and Petropavlovsk, in Siberia.

On October 26th the wireless telephone experiments were continued, communication being effected across the Atlantic from Arlington to the Eiffel Tower, Paris.

In November Mr. Daniels, United States Secretary of the Navy, successfully transmitted from Washington a wireless telephonic naval order to Rear-Admiral Usher at Brooklyn Naval Yard.

On December 1st the wireless station at Macquarie Island was closed for the period of the war.

1916.

In January, by an Order in Council, His Britannic Majesty prohibited to all destinations the export of material for wireless telegraphs and telephones.

In February the Pope, restoring an ancient custom of the Church, announced his intention of officially blessing wireless telegraphy in recognition of its services to mankind.

During the course of a severe blizzard in the United States in February wireless telegraphy was extensively used for train despatching, as the telegraph wires had been destroyed.

In the early part of the year wireless enthusiasts in Holland formed a wireless association, "The Nederlandsche Vereeniging voor Radio-Telegraphie," with headquarters at The Hague.

During the Irish rebellion at Easter in this year wireless telegraphy played an important part, as the insurgents had entirely isolated Ireland by cutting the cable to England.

Among the subjects discussed at the Pan-American Conference held at Buenos Aires in April was the control of wireless telegraphy. This constituted

a big step forward on the part of the South American Republics, clearly proving their appreciation of the necessity of a reliable wireless telegraphic service.

The determination of the difference in longitude between Paris and Washington with the aid of wireless telegraphy, which had been in progress since October, 1913, was completed in May, the result, expressed in terms of time, being 5 hours 17 minutes 35.67 seconds, and has a probable accuracy of the order of .01 second.

On July 28th the *London Gazette* printed the text of a new official regulation requiring the owner of every vessel of 3,000 tons or over registered at a British port in the United Kingdom to take out a licence for a wireless installation before August 21st, 1916, irrespective of whether his ship carries passengers or not.

On September 20th, Judge Mayer, of the U.S.A. District Court, delivered an important decision regarding the suit tried before him, affecting the patents involved in the Fleming Valve controversy, between the Marconi's Wireless Telegraph Company of America and the De Forest Radio Telegraph and Telephone Company. He gave his decision in favour of the former, and his judgment has been pronounced to constitute one of the finest opinions on technical matters delivered from the American Bench.

On November 12th, Senatore Marconi delivered an important lecture at the Lince Academy, Rome, before H.R.H. the Duke of Genoa and a most distinguished audience. He took as his subject those problems of Radiotelegraphy to which scientists are likely to direct their attention in the immediate future.

The initiation of the newly established Trans-Pacific Wireless Service between the U.S. and Japan was celebrated on Wednesday, November 5th, by an interchange of messages between the Mikado and President Wilson.

1917.

On February 28th the wireless station of the *New York Herald*, re-equipped by the Marconi Wireless Telegraph Co. of America, again started operations.

On March 12th a new station was opened at Cape May (New Jersey), about a mile from the old installation and half a mile from the point of Cape May.

On March 12th a Women's Division of the National Amateur Wireless Association was formed in New York for war-time instruction, the first class of 25 convening at Hunter College, New York City.

At the beginning of August the British Government found it advisable in national interests to suspend the Transatlantic Commercial Wireless Service, both eastbound and westbound.

On May 8th the Circuit Court of Appeals, New York City, confirmed the decision of Judge Mayer (reprinted in the YEAR-BOOK for 1917) that the De Forest Audion was an infringement of the Fleming Valve Patent and handed down an unanimous opinion in favour of the Marconi Wireless Telegraph Co. of America.

June 2nd marked the "coming of age" of wireless telegraphy—i.e., that 21 years had elapsed since the registration of patent 12039 in 1896.

On June 6th Senatore Marconi, who was then on a visit to the United States on behalf of Italy, was invested by the world-famous University of

Columbia with the honorary degree of Doctor of Science. Senatore Marconi's visit produced an immensely stimulating effect upon recruiting for wireless in the U.S.A.

On June 29th and 30th tests of Marconi's timed spark for continuous wave generation were carried out between the United Kingdom and the U.S.A.

In June, Commissioner Woods, of New York, pronounced the City's Police Wireless System a "demonstrated success" in a public statement officially issued by him.

In October, 1917, a radiophone fog warning device was installed by the United States Naval Communication Service near Newport, Rhode Island.

In the course of the year the Netherlands Government established two new radiotelegraphic stations on lightships at the Dogger Bank. Several new stations were opened by Norway, one Rundermand Station, near Bergen, and another Tryvand Station, near Christiania.

Wireless communication was also opened up in the course of the year with Tulagi (Solomon Island) and with Ocean Island (Gilbert Group).

1918.

The trend of progress towards continuous wave communication as distinct from that by damped waves was very marked during this year, a particular impetus being given by the continued development of the thermionic valve as an efficient receiver and generator of undamped oscillations. Steady improvement was also evident in the arc form of generator which was installed in many new high-power stations.

Wireless telephony also progressed to a marked extent, particularly in the direction of reliability and increase of range, due mainly to the development of valve generator and receivers.

In the equipment of aircraft with wireless great progress was made, both in radiotelegraphy and radiotelephony.

With the signing of the Armistice the enormous part played in the war by the series of directional wireless stations utilising the Marconi modifications of the Bellini-Tosi Radiogoniometer was made public.

Several new high-power stations, forming part of the scheme of high-power wireless communication in the United States, were opened during the year. One of these, which is claimed to be capable of communicating over a distance of at least 4,000 miles, was erected at Annapolis, Md.

In the Argentine the erection of a station destined for direct communication with the N. American continent was commenced in the vicinity of Buenos Ayres. It is owned by the Pan-American Wireless Telegraph and Telephone Company.

Considerable progress was also made with the erection of a Government wireless station at Karlsborg, Sweden, by the Telefunken Company.

The extension in the application of wireless telegraphy to merchant vessels continued, and at the close of the year some 2,500 to 3,000 vessels of the British Mercantile Marine carried installations.

On August 1st an Order in Council was published to the effect that every British sea-going ship of 1,600 gross tonnage or upwards registered

in New Zealand, in respect of which a licence to instal wireless telegraph apparatus is or has been granted by the Minister of Telegraphs, shall be provided with a wireless telegraph installation, and with two certified operators.

On July 31st the U.S. Government took over all wireless land stations in the United States, with the exception of certain high-power stations, which remained under the control of commercial companies.

In August a powerful station was opened at Balboa, at the entrance to the Panama Canal. In connection with this station a wireless time signal service was inaugurated.

On September 22nd messages transmitted from Carnarvon were received in Sydney, 12,000 miles away. Cable confirmations of these messages were sent forward at the same time, but were received some hours later than the corresponding radiotelegrams.

In March wireless communication was established between San Diego, California, and the American Legation in Pekin, a distance of roughly 7,500 miles.

In April a high-power station was opened at Stavanger, Norway, for the use of the Norwegian Government. This station, which will communicate directly with the United States, was erected by the Marconi Company.

On December 3rd the Marconi Transatlantic Service between Clifden and Glace Bay was reopened for public communication. Commercial working across the Pacific from San Francisco to Hawaii and Japan was resumed on December 19th.

1919.

The year 1919 chiefly was characterised by the publication of some of the wartime researches carried out in various Government Departments.

The eclipse of the sun, on May 29th, was utilised by the British Association Radio Committee for further investigations on the propagation of wireless waves and of atmospheric disturbances. Knowledge of this subject has also been increased by valuable investigations by Dr. Watson, by Dr van der Pol and by Dr Chapman in connection with effects taking place in the upper atmosphere.

In September the British Association resumed their annual meetings, which had been suspended during the latter stages of the war. At this meeting a number of useful papers of wireless interest were presented, dealing particularly with war-time developments.

The several trans-Atlantic aerial flights which took place during the year demonstrated the great utility of wireless communication with aircraft. In both the American flight on the NC 4 machine, and the British on the R 34 dirigible, great use was made of wireless communication. The R 34 was in communication with both sides of the Atlantic during most of the flight.

The temporary war measures relative to the installation of wireless telegraph apparatus on all merchant vessels of 1,600 tons or over have been made permanent by a Bill introduced by Lord Somerleyton.

In February a Spanish decree was issued to the effect that all sailing vessels of 500 tons or over, and carrying fifty or more passengers are to carry a wireless installation.

During the year the Chinese National Wireless Company was formed for the manufacture of wireless equipment in China.

The Companhia Radiotelegraphica Brasileira was also formed to exploit the patents of the Marconi Company in Brazil.

Two subsidiary Marconi Companies—the Marconi Scientific Instrument Company and the Marconi-Osram Valve Company—were formed to take over special work for the parent Company.

In America an important amalgamation was effected with the formation of the Radio Corporation of America, which took over the radio interests of the American Marconi Company and the General Electric Company of Schenectady.

The war-time ban on private and experimental wireless installations was partially removed in this country, and wholly so in America.

Improvements in valve transmitting apparatus for radio-telephony enabled a test to be carried out by the Marconi Company across the Atlantic with the object of ascertaining the minimum power necessary for effective telephonic communication over that range. Good results were obtained using only two transmitting valves.

1920.

The steady development of continuous wave wireless work has been continued during the year and some further progress has been made in the commercial application of valve apparatus. In this connection the full effects of all the wartime radio developments and research have not even yet been felt. A part at least of this work has not been made public, and probably some must remain secret, but the results of further work have recently been released. Of such publications probably the most important was a paper by Mr. B. S. Gossling on "The Development of Thermionic Valves for Naval Uses," which gave an exhaustive summary of the research and test methods developed at H.M. Signal School, Portsmouth, for the design and testing of triode valves during the war. Other valuable papers of this nature were "Direction and Position Finding," by Capt. H. J. Round, which summarised the developments in that field of wireless work, mostly with regard to D.F. Stations on land; "Wireless Telephony on Aeroplanes," by Major C. E. Prince; and "Duplex Wireless Telephony—Some Experiments on its application to Aircraft," by Capt. P. P. Eckersley. All these papers were delivered before the Wireless Section of the Institution of Electrical Engineers.

The annual British Association meeting held at Cardiff at the end of 1920 had little of radio interest, and only one paper dealing directly with the subject was presented.

As regards high power radio stations the Lafayette station at Bordeaux, which was under construction by the United States Navy during the war, has at last been completed, and during August and September of the year under review underwent tests. The first official message from this station was sent out on August 21st, 1920, and was addressed to the Secretary of the United States Navy. It ran as follows: "This first wireless message to be heard around the world marks a milestone on the road of scientific achievement."

As regards other high power stations that at Sayville, which was closed by the United States authorities during the war, was reopened for traffic in April of this year, and a new station at Christiania was opened on January 10th for European traffic only, the Stavanger station being reserved for traffic with the United States. Arrangements are being made for the erection of a new high power wireless station in Japan for direct communication

with a station on the Pacific Coast of the United States, and also a high power station in Denmark for communication with America. The Amalgamated Wireless (Australasia), Limited, propose to establish a high power high-speed radio station near Sydney, or Perth, in order to communicate direct with England. Medium power stations are also to be erected in each of the other States to pass traffic to and from the main trunk station. A powerful station to be available for commercial and official purposes is shortly to be established in Shanghai, and the Radio Bureau of the Swedish Telegraph Department is planning the erection of a large wireless station to deal with traffic for the United States. The Argentine Radiotelegraphic Co., Ltd., is shortly to erect a high power wireless station which will maintain communication with Nauen and other stations of the Telefunken group.

An extremely large wireless station is under contemplation by the Radio Corporation of America for erection on Long Island. Six thousand acres of land have already been purchased and at least five separate aerial systems are to be provided for simultaneous communication with France, Italy, Poland, Scandinavia, Germany and the Argentine.

A number of smaller coastal and other stations whose services have been suspended during the war have recently been reopened for traffic.

A number of D.F. stations both in this and other countries which were originally put up by Government Departments for wartime use have also become available for merchant service purposes and have been giving valuable aid in navigation in difficult waters.

In order to relieve the congestion on the internal telegraph network, the German Government has erected a number of medium power radio stations in the important industrial centres of the country. The majority of the pre-war Press, Time Signal, and Meteorological Services have now been re-established and are available in most countries. A novelty in this direction is the establishment of an astronomical service from the Nauen Station to give information on important astronomical events to all neighbouring observatories, so that observations on outbursts of novæ and similar phenomena may be taken in hand without delay. The British Air Ministry has established a comprehensive scheme of meteorological bulletins, which are transmitted both from their own station and from the Aberdeen Wireless Station several times during the twenty-four hours. These messages give the latest information about flying conditions over the British Isles and neighbouring countries,

As regards improvements in commercial apparatus perhaps the most noticeable have been those of wireless telephonic apparatus carried out by Marconi's Wireless Telegraph Company at Chelmsford. On a number of occasions during the year transmissions have been carried out from that station using as much as 15 kw., and regular concert programmes have also been sent. These transmissions have been picked up as far away as St. John's, Newfoundland, a range of 2,673 miles, while ships 1,000 miles at sea have also overheard the programmes. The successful linking up of wireless telephonic apparatus with the land line telephones has been accomplished. Experiments in this direction have been carried on for some time past, and on August 19th a successful connection was established between a subscriber's instrument in London and an aeroplane in flight on its way to Paris. Regular wireless telephonic transmissions have also been carried on from a Dutch Wireless Station.

Continuous wave valve apparatus is also being applied extensively on seaboard, and a number of well-known liners have been fitted with powerful installations which enable them to maintain direct communication with the land over distances of at least 1,400 miles. In connection with the development of continuous wave apparatus the United States Naval Communication

Service report that they have so increased the reliability of manufacture of valves that their effective life has been increased to over 5,000 hours.

The United States battleship *Iowa* has been fitted with a radio control installation and experiments have been carried out by the United States Naval Department to test the possibility of navigating this 12,000 ton vessel from the shore. The control is stated to have been thoroughly efficient up to a maximum distance of ten or twelve miles.

The Imperial Wireless Telegraphy Committee, which was appointed on November 24th, 1919, by the Secretary of State for the Colonies "to prepare a complete scheme of Imperial wireless communications in the light of modern wireless science and Imperial needs," published its report in June. In this report they recommend the adoption of a scheme using thermionic valve apparatus at transmitting stations, with stages not exceeding 2,000 miles in length.

The Government of India has formed an Indian Wireless Telegraph Board, with a view to extending and reorganising its existing telegraph system, in order to meet the strategic, political and commercial requirements of the Empire.

An Air Conference, organised by the Air Ministry, was held in London from October 12th to 14th. A number of papers were read and discussed at this meeting, which emphasised the importance of wireless equipment on aircraft, not only for direction finding, but also for communicating with the landing grounds and with the land telephone system by wireless telephony, and for the rapid circulation of weather forecasts.

The Department of Scientific and Industrial Research has established four sub-committees to assist the Radio Research Board. These are to deal respectively with the following branches of radio research: (a) the propagation of wireless waves; (b) atmospherics; (c) directional wireless; (d) thermionic valves.

It was announced on July 21st that the German Wireless Stations were all in full and unrestricted operation again.

As from January 10th of this year the Republic of Czecho-Slovakia adhered to the Telegraphic and Radiotelegraphic Conventions.

On January 14th a law was passed in Greece making the carrying of wireless apparatus obligatory on all Greek merchant ships of 1,600 tons gross and upwards, or having 50 or more persons aboard including crew. Certain modifications have also been made in the rules and regulations governing wireless telegraphy in the British Mercantile Marine. As from September 1st, 1920, automatic call apparatus may be installed subject to the approval of the Board of Trade. For voyages other than coastwise ones exceeding 48 hours from port to port any vessel carrying 200 passengers or more must carry three operators. For voyages exceeding eight hours, but less than 48 hours from port to port, two operators must be carried. Regulations have also been issued relative to the carrying of wireless telegraph watchers on board in place of one or more certificated wireless operators.

The Gold Medal of the Institute of Radio Engineers for the year 1920 has been awarded by the Board of Direction of the Institute to Senatore Marconi.

The Paris Academy of Sciences Herbert Prize for 1919 was awarded early in 1920 to Raymond Jouaust for his work on Magnetism, Electrical Standards, Photometry and Wireless Telegraphy.

The American Academy of Arts and Sciences has awarded the Rumford premium to Dr. Irving Langmuir for his research in thermionic and allied phenomena.

During the year a number of new companies interested in or connected with radiotelegraphy have been formed. Amongst these we may mention the Societatea Marconi at Bucarest, Roumania; Société Radio-technique en Pologne at Warsaw (to undertake the manufacture, installation and maintenance in Poland of every system of telegraphy including wireless); The Société Independante Belge de Télégraphie sans fil at Brussels; The Continental Radio Telephone and Telegraph Company at Dallas, Texas; The Radio Engineering Company, Ltd.; and The Argentine Radiotelegraphic Company, Ltd.

A new Radio Society has been formed in Holland, known as the Nederlandsch Radio Genootschap, with the object of being the centre of scientific radio work in Holland. This society is contemplating the publication of the technical proceedings of its meetings. Two new French wireless publications have also appeared during the year, *Radioélectricité* and *La T. S. F. Moderne*, the former of which deals with technical wireless development as well as marine and commercial information.

Professor A. Righi, who was one of the earliest workers in the radiotelegraphic field and of whom Senatore Marconi was a pupil, died this year at Bologna. The death is also announced of Major S. C. A. Wace, head of the British Wireless Telegraphy Board.

Amateur wireless work in this and other countries has progressed steadily during the year with the gradual removal of wartime restrictions. The number of radio amateurs in the United States is now over 200,000, and useful work is in many cases being undertaken in co-operation with Government Departments. The restrictions on private wireless in Australia have been modified to some extent, and licences are now being granted both for transmission and reception.

**NATIONAL AND
INTERNATIONAL
WIRELESS LAWS
& REGULATIONS**

- (A) **Résumé of Radiotelegraphic Legislation.**
- (B) **Text of International Radiotelegraphic Convention.**
- (C) **Text of International Convention on Safety of Life at Sea.**
- (D) **Wireless Laws and Regulations of the Countries of the World.**

RÉSUMÉ OF RADIOTELEGRAPHIC LEGISLATION

LEGISLATION relating to Wireless Telegraphy does not date back further than the year 1903, although four years earlier (in 1899) the Marconi system had reached a point of development sufficiently advanced for the British Admiralty to think it desirable to obtain sets of apparatus for trial, and two years later (in 1901) an agreement of a limited nature was entered into between the Admiralty and the Company for the supply of Marconi apparatus. In July, 1903, a further and more complete agreement was concluded. At that time the increasing use of Wireless Telegraphy for maritime purposes throughout the world had raised questions of international interest, and circumstances had clearly demonstrated that international agreement was desirable with regard to many points dealing with the interchange of messages through the newly established medium.

A conference met at Berlin in August, 1903, on the invitation of the German Government. As a result of that conference all the Powers, with the exception of Great Britain and Italy, agreed to certain proposals, to be considered at a subsequent conference, for the international regulation of Wireless Telegraphy.

The Wireless Telegraphy Act, which was passed in 1904 for two years only, and which was renewed in 1906 without modification (and is still in force), prohibits the installation or working of wireless telegraph apparatus in the United Kingdom, or on board British ships, except under licence from the Postmaster-General. Its principal objects were, by means of systematic regulations, to make Wireless Telegraphy more useful for purposes of defence and general communication. The memorandum which was laid before the House of Commons in explanation of the Bill stated that the necessity for legislation depended, firstly, on the importance from the naval point of view of giving the Government control over wireless stations in time of war or emergency; and, secondly, on the desirability of placing the Government in such a position as to have the power of entering into an agreement on the subject with other countries if it should be found expedient to do so.

In October, 1906, a second International Conference was held in Berlin, and its primary objects may be classified under the following headings:— (1) The acceptance and transmission of telegrams. (2) The adoption of rules of working. (3) The provision of means of collecting charges and settling accounts between the different countries. (4) Arrangements for the publication of all information necessary for inter-communication. (5) Rules to prevent interference and confusion in working, with adequate provisions for enforcement. (6) Provision that, with certain exceptions, inter-communication must not be refused on account of the differences in the systems of Wireless Telegraphy employed.

The documents signed at Berlin on November 3rd, 1906, consisted of:— (a) The Convention; (b) the Additional Undertaking; (c) the Final Protocol; (d) the Service Regulations. These documents were revised at the London Convention held in 1912, and the Radiotelegraphic Convention which came into operation on July 1st, 1913, is printed *in extenso* in the following pages. About 40 per cent. of the delegates present at the last conference were administrative, executive, or technical officials, acting for the postal telegraph and cable departments of the various countries represented. About another third of the assembly (37 per cent.) were composed of army and navy officers the relative ratio of naval and military officers being about 4 to 3. About 6 per cent. of the delegates were trained and experienced diplomats, and the remainder included eminent scientists, noted meteorologists, and prominent personages interested in the technical, commercial, and humanitarian development of wireless telegraphy.

The signing of the International Convention for the Safety of Life at Sea on January 20th, 1914, constituted a most noteworthy advance in the legislation relating to Wireless Telegraphy. The Convention was drawn up by an International Conference which met in London on November 12th, 1913, and laid down, *inter alia*, the minimum Wireless Telegraphy equipment to be carried by ships of different grades. For the purpose of defining the hours of service (*i.e.*, setting out the times when the various stations are to open for the receipt and transmission of messages) the Radiotelegraphic Convention, 1912, divided ship stations into three classes, but did not specify which vessels (by virtue of the services maintained on board) should be placed in the various classes. Under the provisions of the Safety of Life at Sea Convention which deal with Wireless Telegraphy, these classes are clearly defined.

In order to give effect to this International Convention, the British Government has amended the laws relating to merchant ships by the Merchant Shipping (Convention) Act, 1914, and the Merchant Shipping (Wireless Telegraphy) Act, 1919. Part III of the former deals with Wireless Telegraphy, and together with the 1919 Act, is reprinted under "*United Kingdom*," in the "*Laws and Regulations*" section of this book.

At the outbreak of the late war immediate steps were taken by the Governments of the belligerent countries to bring the use of Wireless Telegraphy under direct official control, and all stations not operated under Government supervision were ordered by the respective Governments to be dismantled.

This action, as might well have been expected, did not stop at the belligerent countries, but extended to neutral Governments almost all over the world. It was necessary that steps should be taken by non-belligerent powers to ensure that their neutrality obligations were not violated by the utilisation of wireless stations in their territory for the transmission of communications of a non-neutral character. Consequently, almost all countries throughout the world issued special regulations relating to the use of Wireless Telegraphy in war time. A number of these wartime measures have not, even yet, been repealed, and such as remain in force will be found printed in the section of this book devoted to the Laws and Regulations of the World.

The central agency established for the purpose of collecting and distributing information in accordance with the requirements of the International Radiotelegraphic Convention is commonly known as the "Berne Bureau." This is merely a branch of the Bureau of the International Telegraph Union, situated at Berne, in Switzerland. It possesses neither powers for initiating new regulations nor for dealing with those already existing; its functions are practically entirely confined to the collection and circulation of information.

Notwithstanding this, the International Bureau at Berne has become an organisation of supreme importance, thanks to the zealous, economical and efficient manner in which it is conducted. To this organisation is entrusted the work of preparing and circulating, in accordance with Article 13 of the Convention, particulars regarding every station located in countries adhering to the Convention.

The normal supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 francs per annum. This sum, however, does not include any special expenditure such as would be necessitated by the holding of an International Conference. For the purpose of fixing their respective contributions towards the expenses, the governing bodies of the contracting States are divided into six classes, as set forth in Article 43 of the regulations.

INTERNATIONAL RADIOTELEGRAPHIC CONVENTION

London, July 5th, 1912.

INTERNATIONAL Radiotelegraphic Convention concluded between Great Britain and various British Colonies and Protectorates,* Union of South Africa, Commonwealth of Australia, Canada, British India, New Zealand, Greece, Italy and Italian Colonies, Germany and Protectorates, United States of America and Possessions, Argentina, Austria, Hungary, Bosnia-Herzegovina, Belgium, Belgian Congo, Brazil, Bulgaria, Chili, Denmark, Egypt, France and Algeria, French West Africa, French Equatorial Africa, Greece, Indo-China, Madagascar, Tunis, Japan and Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung, Morocco, Monaco, Norway, Netherlands, Dutch Indies, Curaçoa, Persia, Portugal and Portuguese Colonies, Roumania, Russia and Russian Possessions and Protectorates, San Marino, Siam, Spain and Spanish Colonies, Sweden, Turkey and Uruguay.

The undersigned Plenipotentiaries of the Governments of the countries enumerated above, being assembled in Conference in London, have, by mutual consent, and subject to ratification, concluded the following Convention :—

ARTICLE 1.

Application of Provisions.

The High Contracting Parties undertake to apply the provisions of the present Convention at all the radiotelegraph stations (coast stations and ship stations) which are established or worked by the Contracting Parties and open for the service of public correspondence between the land and ships at sea.

They undertake, moreover to impose the observance of these provisions upon private enterprises authorised either to establish or to work radiotelegraphic coast stations open to the service of public correspondence between the land and ships at sea, or to establish or to work radiotelegraphic stations whether open for public correspondence or not on board the ships which carry their flag.

ARTICLE 2.

Interpretation of Terms.

The term coast station means radiotelegraphic station established on land or on board any ship permanently anchored and used for the exchange of correspondence with ships at sea.

The term ship station means any radiotelegraphic station established on board a ship other than a permanently moored ship.

ARTICLE 3.

Compulsory Interchange of Messages.

Coast stations and ship stations are bound to exchange radiotelegrams reciprocally without regard to the radiotelegraph system adopted by such stations.

Each ship station is bound to exchange radiotelegrams with any other ship station without distinction as to radiotelegraphic system adopted by such stations.

Nevertheless, in order not to impede scientific progress, the provisions of the present Article do not prevent the contingent employment of a radiotelegraphic system incapable of communicating with other systems, provided that such incapacity be due to the specific nature of such system and that it be not caused by devices adopted solely with the object of preventing inter-communication.

ARTICLE 4.

Restriction of Service.

Notwithstanding the provisions of Article 3, a station may be appropriated to a restricted public service determined by the object of the correspondence or by other circumstances independent of the system employed.

ARTICLE 5.

Connection with Land Telegraph System.

Each of the High Contracting Parties undertakes to cause the coast stations to be connected with the telegraph system by means of special wires, or, at least, to take such other measures as will ensure a rapid exchange between the coast stations and the telegraph system.

ARTICLE 6.

Notification of Particulars.

The High Contracting Parties shall mutually notify one another of the names of the coast stations and ship stations covered by Article 1,

* Barbados, Basutoland, Bermudas, Borneo, Ceylon, Cyprus, Gold Coast and Ashanti, Malay States (Perak, Selangor, Negri Sembilan, Pahang), Gambia, Gibraltar, British Guiana, British Honduras, Hong Kong, Bahama Islands, Windward Islands (Grenada, St. Lucia, St. Vincent), Falkland Islands, Fiji Islands, Jamaica, Turks and Caicos Islands, Cayman Islands, Leeward Islands (Antigua, Montserrat, St. Kitts-Nevis, Dominica, Virgin Islands), Malta, Mauritius, Northern and Southern Nigeria, Western Pacific Islands (Fanning Island, Gilbert and Ellice Islands, British Solomon Islands), East African Protectorate, Uganda, Bechuanaland, Nyassaland, British Somaliland, Northern and Southern Rhodesia, Seychelles, Sierra Leone, St. Helena, Straits Settlements (Labuan, Cocos Islands), Swaziland, Trinidad and Tobago. Wei-hai-wei,

as well as of all the particulars necessary to facilitate and accelerate the radiotelegraphic exchanges as specified in the Detailed Regulations.

ARTICLE 7.

Other Radiotelegraphic Arrangements.

Each of the High Contracting Parties reserves to itself the right to prescribe or to permit in the stations covered by Article 1—independently of the installation of which the particulars are published conformable to Article 6—the installation and working of other arrangements designed for special radiotelegraphic transmission without publication of the details of such devices.

ARTICLE 8.

Interference with Other Stations.

The working of radiotelegraphic stations shall be organised as far as possible in such a manner as not to interfere with the working of other stations of the kind.

ARTICLE 9.

Distress Calls.

Radiotelegraphic stations shall be obliged to accept with absolute priority calls of distress from whatever source, to reply in like manner to such calls, and to give the effect to them which they require.

ARTICLE 10.

Charges.

The charge for a radiotelegram shall include, according to the circumstances:—

1. (a) The "coast charge" which accrues to the coast station.

(b) The "ship charge" which accrues to the ship station.

2. The charge for transmission over the lines of the telegraph system, calculated in accordance with the ordinary rules.

3. The transit charges of the intermediate coast or ship stations and the charges appertaining to special services required by the sender.

The rate of the coast charge shall be subject to the approval of the Government to whose authority the coast station is subject, and the rate of the ship charge to the approval of the Government to which the ship belongs.

ARTICLE 11.

Validity and Modifications.

The provisions of the present Convention are completed by Detailed Regulations which have the same validity and come into force at the same time as the Convention.

The provisions of the present Convention and of the Regulations relating thereto may be modified at any time by mutual consent of the High Contracting Parties. Conferences of Plenipotentiaries having power to modify the Convention and the Regulations shall take place periodically; each Conference shall itself fix the place and time of the succeeding Conference.

ARTICLE 12.

Exercise of Voting Powers.

These Conferences shall be composed of Delegates of the Governments of the Contracting Parties.

In the deliberations each country shall have one vote only.

If a Government adhere to the Convention or its colonies, possessions or protectorates, subsequent Conferences may determine that the whole or part of such colonies, possessions or protectorates is to be regarded as forming a country for the purposes of the foregoing clauses. But the number of votes to be exercised by a Government, including its colonies, possessions or protectorates, may not exceed six.

The following are regarded as forming a single country for the purposes of the present Article:—

The Union of South Africa.
The Australian Commonwealth.
Canada.
British India.
New Zealand.
Ex-German East Africa.
Ex-German South-West Africa.
The Cameroons.
Togoland.
The Ex-German Pacific Protectorates.
Alaska.
Hawaii and the other American possessions in Polynesia.
The Philippine Islands.
Porto Rico and the American possessions in the Antilles.
The zone of the Panama Canal.
The Belgian Congo.
The Spanish Colony of the Gulf of Guinea.
French West Africa.
French Equatorial Africa.
Indo-China.
Madagascar.
Tunisia.
Erythrea.
Italian Somaliland.
Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung.
The Dutch Indies.
The Colony of Curaçao.
Portuguese West Africa.
Portuguese East Africa and the Portuguese possessions in Asia.
Russian Central Asia (littoral of the Caspian Sea).
Bokhara.
Khiva.
Western Siberia (littoral of the Arctic Ocean).
Eastern Siberia (littoral of the Pacific Ocean).

ARTICLE 13.

Collection of Information.

The International Bureau of the Telegraph Union shall be entrusted with the duty of collecting, co-ordinating, and publishing information of every kind relating to radiotelegraphy; of circulating in proper form proposals for the modification of the Convention and of the Regulations; of notifying the changes adopted, and, generally, of carrying out any Administrative work which it may be called upon to undertake in the interests of International Radiotelegraphy.

The expenses of this institution shall be borne by all the Contracting Parties.

ARTICLE 14.

Conditions of Transmission and Receipt.

Each of the High Contracting Parties reserves to itself the right to fix the conditions under which it will admit radiotelegrams coming from or destined for a station, whether a ship station or a coast station, which is not subject to the provisions of the present Convention.

If a radiotelegram is admitted, the ordinary charges must be applied to it.

Every radiotelegram originating at a ship station and received by a coast station of the contracting country, or accepted in transit by the Administration of a contracting country, shall be sent forward.

Every radiotelegram intended for a ship shall also be sent forward if the Administration of the contracting country has accepted it from the sender, or if the Administration of a contracting country has accepted it in transit from a non-contracting country, subject to the right of the coast station to refuse transmission to a ship station belonging to a non-contracting country.

ARTICLE 15.

Further Applications.

The provisions of the Articles 8 and 9 of this Convention are equally applicable to radio-telegraphic installations other than those indicated in Article 1.

ARTICLE 16.

Admission of New Parties.

Governments which have not taken part in the present Convention shall be allowed to become party to it at their own request.

Such adherence shall be notified through diplomatic channels to that one of the contracting Governments in whose territory the last Conference was held, and by that Government to the others.

Such adherence shall involve complete acceptance of all the clauses of the present Convention and admission to all the advantages stipulated therein.

The adherence to the Convention of the Government of a country having colonies, possessions, or protectorates shall not carry with it the adherence of the colonies, possessions, or protectorates of such Government, unless a declaration be made to that effect by such Government. These colonies, possessions, or protectorates as a whole, or each one of them separately, may form the subject of a separate adherence or of a separate denunciation under the conditions indicated in the present Article and in Article 22.

ARTICLE 17.

Application of International Telegraph Convention of 1875.

The provisions of Articles 1, 2, 3, 5, 6, 7, 8, 11, 12, and 17, of the International Telegraph Convention of St. Petersburg dated 10/22 July, 1875, shall be applicable to International Radiotelegraphy.

ARTICLE 18.

Arbitration.

In cases of difference of opinion between two or more contracting Governments concerning the interpretation or the execution either of the present Convention or of the Regulations provided for by Article 11, the question at issue may, by mutual consent, be submitted to arbitration. In that event each of the Governments concerned shall choose another not interested in the question.

The decision of the Arbitrators shall be made by an absolute majority of votes.

In the event of an equality of votes, the Arbitrators shall appoint, in order to settle the difficulty, another Contracting Government not concerned in the question in dispute. In default of an agreement with regard to such

choice, each Arbitrator shall propose a Contracting Government not interested in the dispute; and lots shall be drawn as between the Governments proposed. The drawing of lots shall be the prerogative of the Government in whose territory the International Bureau provided for in Article 13 performs its work.

ARTICLE 19.

Legislative Measures.

The High Contracting Parties undertake to adopt or to propose to their respective legislatures the measures necessary to ensure the execution of the present Convention.

ARTICLE 20.

Communication between Contracting Parties.

The High Contracting Powers shall communicate to one another such laws as may have been already enacted or which may be about to be so enacted in their countries, relating to the subject of the present Convention

ARTICLE 21.

Freedom of Action.

The High Contracting Parties maintain their entire liberty concerning the radiotelegraphic installation not covered by Article 1, and particularly with regard to naval and military installations, and also to stations carrying out communications between fixed points. All such installations and stations shall remain subject solely to the obligations provided for in Articles 8 and 9 of the present Convention.

Nevertheless, when these installations and stations carry out an exchange of maritime public correspondence, they shall conform, in carrying out such service, to the requirements of the Regulations so far as concerns the method of transmission and accounting.

If, on the other hand, coast stations carry out, at the same time as public correspondence with ships at sea, communications between fixed points, they shall not be subject, in the execution of this latter service, to the provisions of the Convention, except as to the observance of Articles 8 and 9 of this Convention.

However, fixed stations which carry out correspondence between land and land must not refuse the exchange of radiotelegrams with another fixed station on account of the system adopted by such station; nevertheless, the liberty of each country shall remain complete in respect of the organisation of the service for correspondence between fixed points and the decision as to the correspondence to be carried out by the stations appropriated to such service.

ARTICLE 22.

Date of Operation.

The present Convention shall come into execution on and from the 1st July, 1913, and shall remain in force for an indeterminate period and until the expiry of one year from the day upon which it is denounced.

Denunciation shall only take effect as regards the Government in whose name it is made. So far as the other Contracting Parties are concerned, the Convention shall remain in force.

ARTICLE 23.

Ratification.

The present Convention shall be ratified, and the ratification thereof shall be deposited in London with as little delay as possible.

If one or more of the High Contracting Parties shall not ratify the Convention, it shall not be less valid thereby for the parties which have ratified it.

In witness whereof the respective Plenipotentiaries have signed the Convention in a single copy, which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each Party.

London, the 5th of July, 1912.

FINAL PROTOCOL.

At the time of proceeding to the signature of the Convention adopted by the International Radiotelegraphic Conference of London, the undersigned Plenipotentiaries have agreed as follows :—

I.

The exact nature of the adherence notified on the part of Bosnia-Herzegovina not being yet determined, it is recognised that Bosnia-Herzegovina is entitled to a vote, a decision at a later date being necessary on the question whether this vote belongs to Bosnia-Herzegovina in virtue of the second paragraph of Article 12 of the Convention, or whether this vote is accorded to it conformably to the provisions of the third paragraph of that Article.

II.

The following declaration is placed on record :—

The Delegation of the United States declares that its Government is under the necessity of abstaining from all action with regard to tariffs, because the transmission of radiotelegrams as well as of telegrams in the United States is undertaken, wholly or in part, by commercial or private companies.

III.

The following declaration was also placed on record :—

The Government of Canada reserves to itself the right to fix separately, for each of its coast stations, a total sea charge for radiotelegrams originating from North America and intended for any ship whatever, the coast charge amounting to three-fifths and the ship charge to two-fifths of such total charge.

In witness whereof the respective Plenipotentiaries have drawn up the present Final Protocol, which shall have the same force and the same validity as if the provisions thereof had been inserted in the text itself of the Convention to which it belongs, and they have signed it in a single copy which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each party.

London, the 5th of July, 1912.

SERVICE REGULATIONS ANNEXED TO THE INTERNATIONAL RADIOTELEGRAPHIC CONVENTION.

CONTENTS.

1. Organisation of radiotelegraphic stations.
2. Hours of service of stations.
3. Form and acceptance of radiotelegrams.
4. Charges.
5. Collection of charges.
6. Transmission of radiotelegrams :—
 - (a) Signals of transmission.
 - (b) Order of transmission.
 - (c) Calling of stations and transmission of radiotelegrams.
 - (d) Acknowledgment of receipt and end of work.
 - (e) Route to be followed by radiotelegrams.
7. Delivery of radiotelegrams.
8. Special radiotelegrams.
9. Records.
10. Refunds and reimbursements.
11. Accounting.
12. International Bureau.
13. Meteorological, time, and other transmissions.
14. Miscellaneous provisions.

I.—ORGANISATION OF RADIO-TELEGRAPHIC STATIONS.

1.

Choice of Apparatus.

The choice of radiotelegraphic apparatus and devices to be used by coast stations and ship stations is free. The installation of these stations must, as far as possible, be in keeping with scientific and technical progress.

II.

Wavelength.

Two wavelengths, one of 600 and the other of 300 metres, shall be admitted for the service of general public correspondence. Every coast station open to this service must be equipped in such a way as to be able to use these two wavelengths, of which one shall be designated as the normal wavelength of a station. During the whole time that it is open

every coast station must be in a position to receive calls made by means of its normal wavelength. Nevertheless, for the correspondence covered by paragraph 2 of Regulation XXXV, use shall be made of a wavelength of 1,800 metres. Further, each Government may authorise the use, in a coast station, of other wavelengths for the purpose of securing a long-range service or a service other than that of general public correspondence, and established in conformity with the provisions of the Convention, with the reservation that these wavelengths do not exceed 600 metres, or that they do exceed 1,600 metres.

In particular, stations used exclusively for the despatch of signals intended to determine the position of ships must not use wavelengths exceeding 150 metres.

III.

Equipment.

1. Every ship station must be equipped in such a way as to be able to use the wavelengths of 600 metres and of 300 metres. The first shall be the normal wavelength, and may not be exceeded in transmission, the case of Regulation XXXV (paragraph 2) excepted.

Use may be made of other wavelengths not exceeding 600 metres in special cases, and subject to the approval of the Administrations to which the coast stations and ship stations concerned are subject.

2. During the whole time that it is open every ship station must be able to receive calls made by means of its normal wavelength.

3. Ships of small tonnage, in the case of which it would be materially impossible to use the wavelength of 600 metres for transmission, may be authorised to employ exclusively the wavelength of 300 metres; they must be able to receive by means of the wavelength of 600 metres.

IV.

Communication.

Communications between a coast station and a ship station, or between two ship stations, must be exchanged on both sides by means of the same wavelength. If, in a particular case, communication is difficult, the two stations may, by mutual consent, pass from the wavelength by means of which they are communicating to the other regulation wavelength. Both stations shall resume their normal wavelengths when the radiotelegraphic exchange is finished.

V.

Map and Nomenclature.

1. The International Bureau shall prepare, publish and revise periodically an official map showing the coast stations, their normal ranges, the principal lines of navigation, and the time normally taken by ships for the voyage between the various ports of call.

2. It shall draw up and publish a Nomenclature of the radiotelegraphic stations covered by Article 1 of the Convention, and also periodical supplements for additions and modifications. This Nomenclature shall give, in the case of each station, the following information:—

1st.—For coast stations: the name, nationality, and geographical position indicated by the territorial subdivision and by the longitude and latitude of the place; for ship stations: the name and nationality of the ships; when the case arises, the name and address of the contractor.

2nd.—The call signal. (The call signals must be differentiated from one another, and each one must consist of a group of three letters.)

3rd.—The normal range.

4th.—The radiotelegraphic system with the characteristics of the system of discharge (musical sparks, tone expressed by the number of double vibrations, etc.).

5th.—The wavelengths used (the normal wavelength to be underlined).

6th.—The nature of the services performed.

7th.—The hours of working.

8th.—When necessary the hour and method of despatch of time signals and meteorological telegrams.

9th.—The coast or ship charge.

3. There shall also be included in the Nomenclature such information relating to radiotelegraphic stations other than those covered by Article 1 of the Convention, as shall be communicated to the International Bureau by the Administrations to which such stations are subject, provided that these are either Administrations which are parties to the Convention, or, if they are not parties to it, have made the declaration provided for in Regulation XLVIII.

4. The following notations shall be adopted in documents for the use of the international service to designate radiotelegraph stations:—

PG—station open for general public correspondence.

PR—Station open for restricted public correspondence.

P—private station.

O—station open only for official correspondence.

N—station always open.

X—station not having fixed working hours.

5. The name of a ship station indicated in the first column of the Nomenclature must be followed, when there is duplication of the name, by the call-signal of such station.

VI.

Experiments and Practice.

The exchange of unnecessary signals and words is forbidden to the stations covered by Article 1 of the Convention. Experiments and practice shall not be allowed in these stations, except so far as they do not disturb the service of other stations.

Practice must be carried out with wavelengths different from those allowed for public correspondence, and with the minimum of power necessary.

VII.

Compulsory Conditions.

1. All stations are bound to exchange traffic with the minimum of energy necessary to ensure good communication.

2. Every coast and ship station must comply with the following conditions:—

(a) The waves emitted must be as pure and as little damped as possible.

In particular, the use of transmitting devices in which the production of the waves emitted is obtained by discharging the aerial direct by sparks (plain aerial) shall not be allowed except in cases of distress.

It may, however, be allowed in the case of certain special stations (for example, those of small ships) in which the primary power does not exceed 50 watts.

(b) The apparatus must be capable of transmitting and receiving at a speed at least equal

to 20 words per minute, the word being reckoned at the rate of five letters.

New installations bringing into play an energy of more than 50 watts shall be equipped in such a way that it may be possible to obtain easily several ranges less than the normal range, the shortest being of approximately 15 nautical miles. Installations already established bringing into play an energy of more than 50 watts shall be transformed as far as possible in such a manner as to satisfy the foregoing requirements.

(c) Receiving apparatus must allow of receiving, with the greatest possible amount of protection from disturbance, transmissions made with the wavelengths specified in present Regulations, up to 600 metres.

3. Stations serving solely for determining the position of ships (*radiophares*) must not operate over an area of greater radius than 30 nautical miles.

VIII.

Power.

Independently of the general conditions specified in Regulation VII., ship stations must also satisfy the following conditions:—

(a) The power transmitted to the radiotelegraphic apparatus, measured at the terminals of the generator of the station, must not under normal circumstances exceed one kilowatt.

(b) Subject to the provisions of Regulation XXXV, par. 2, a power exceeding one kilowatt may be used if the ship is under the necessity of corresponding at a distance of more than 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be realised except by means of an increase of power.

IX.

Licences.

1. No ship station may be established or worked by private enterprise without a licence issued by the Government to which the ship is subject.

Stations on board ship having their port of register in a colony, possession, or protectorate may be described as being subject to the authority of such colony, possession, or protectorate.

2. Every ship station holding a licence issued by one of the contracting Governments must be regarded by the other Governments as having an installation fulfilling the conditions imposed by the present Regulations.

The competent authorities of the countries where the ship calls may demand the production of the licence. In default of such production, these authorities may ascertain whether the radiotelegraph installations of the ship satisfy the conditions imposed by the present Regulations.

When an Administration has practical evidence that a ship station is not fulfilling these conditions, it must, in every case, address a complaint to the Administration of the country to which the ship is subject. From that point onwards the procedure shall be, when necessary, as provided in Regulation XII., paragraph 2.

X.

Certificates.

1. The service of the ship station must be carried out by a telegraphist holding a certificate issued by the Government to which the

ship is subject, or, in an emergency and for one voyage only, by another Government party to the convention.

2. There shall be two classes of certificates:—
The first-class certificate shall state the professional qualifications of the operator with regard to:—

(a) the adjustment of the apparatus and knowledge of their working;

(b) transmitting and receiving by ear, at a speed which must not be less than 20 words per minute;

(c) knowledge of the regulations applying to the exchange of radiotelegraphic communications.

The second-class certificate may be issued to a telegraphist who only attains to a speed in transmitting and receiving of 12 to 19 words per minute, but who fulfils the other conditions mentioned above. Telegraphists holding a second-class certificate may be allowed:—

(a) on ships only using radiotelegraphy for their own service and for the correspondence of the ship's company, in particular on fishing vessels;

(b) on all ships as substitutes, provided that such ships have on board at least one operator holding a first-class certificate. Nevertheless, on ships placed in the first class indicated in Regulation XIII., the service must be carried out by at least two telegraphists holding first-class certificates.

In ship stations, transmissions may only be made by a telegraphist holding a first or second-class certificate, an exception being made in cases of emergency, in which it would be impossible to conform to this provision.

3. Further, the certificate shall testify that the Government has placed the telegraphist under the obligation of preserving the secrecy of correspondence.

4. The radiotelegraph service of the ship station shall be placed under the supreme authority of the captain of the ship.

XI.

Emergency Equipment.

Ships provided with radiotelegraph installations and placed in the first two classes indicated in Regulation XIII shall be bound to have emergency radiotelegraph installations of which all the parts shall be placed in conditions of the greatest safety possible, such conditions to be determined by the Government which issues the licence. These emergency installations must have at command a source of power of their own, must be capable of being set working speedily, must be able to work for six hours at least, and must have a minimum range of 80 nautical miles in the case of ships in the first class, and of 50 miles in the case of those of the second class. This emergency installation shall not be required in the case of ships whose ordinary installation fulfils the conditions of the present article.

XII.

Responsibility for Breach of the Convention.

1. If an Administration has information of a breach of the Convention or of the Regulations committed in one of the stations which it has authorised, it shall ascertain the facts and fix the responsibility.

In the case of ship stations, if the responsibility rests on the operator, the Administration shall take the necessary steps, and, if necessary, shall withdraw the certificate. If it is shown that the breach was due to the condition of the

apparatus or to instructions given to the telegraphist, the same procedure shall be followed in respect of the licence issued to the ship.

2. In the event of repeated breaches by the same ship, if the representations made to the Administration to which the ship is subject, by another Administration, remain without effect, the latter shall have the right, after notice given, of authorising its coast stations not to accept communications coming from the ship in question. In case of a difference between the two Administrations the questions shall be submitted to arbitration on the request of one of the Governments concerned. The procedure is indicated in Article XVIII. of the Convention.

II.—HOURS OF SERVICE OF STATIONS.

XIII.

Land and Ship Stations.

(a) *Coast Stations.*

1. The service of coast stations shall be, as far as possible, permanent, day and night, without interruptions.

Nevertheless, certain coast stations may have a service of limited duration. Each Administration shall fix the hours of service.

2. Coast stations whose service is not permanent may not close before having transmitted all their radiotelegrams to the ships which are in their radius of action nor before having received from such ships all the radiotelegrams of which notice has been given. This provision shall also apply when ships notify their presence before work has actually ceased.

(b) *Ship Stations.*

3. Ship stations shall be placed in three classes:—

- (1st) Stations always open;
- (2nd) stations having limited working hours;
- (3rd) stations having no fixed working hours.

During navigation, the following must remain permanently on the watch: (1st) ships of the first class; (2nd) those of the second class, during the hours that they are open for service; out of these hours, the latter stations must remain on the watch for the first 10 minutes of each hour. The stations of the third class are not bound to perform any regular "listening" service.

It shall fall to the Governments which issue the licences specified in Article IX. to fix the class in which the ship is to be placed, in respect of its obligations in the matter of keeping watch. This classification shall be mentioned in the licence.

III.—DRAWING UP AND HANDING IN OF RADIO-TELEGRAMS.

XIV.

Transmission from Ship to Land.

1. Radiotelegrams shall bear, as the first word of the preamble, the service instructions "radio."

2. In the transmission of radiotelegrams coming from a ship at sea, the date and the hour of the handing in at the ship station shall be indicated in the preamble.

3. On forwarding over the telegraph system, the coast station shall insert, as the indication

of the office of origin, the name of the ship of origin as it appears in the Nomenclature, and also, when the case arises, that of the last ship which served as an intermediary. These particulars shall be followed by the name of the coast station.

XV.

Transmission from Land to Ship.

1. The address of radiotelegrams intended for ships must be as complete as possible. It shall be compulsorily drawn up as follows:—

(a) Name or title of the addressee, with supplementary particulars if necessary.

(b) Name of the ship, as it appears in the first column of the Nomenclature.

(c) Name of the coast station, as it appears in the Nomenclature.

Nevertheless the name of the ship may be replaced, at the risks and perils of the sender, by the particulars of the voyage taken by such ship and determined by the names of the ports of origin and destination or by any other equivalent particulars.

2. In the address, the name of the ship, as it appears in the first column of the Nomenclature, shall be counted in every case, and independently of its length, as one word.

3. Radiotelegrams drawn up by means of the International Signal Code shall be forwarded to their destination without being de-coded.

IV.—CHARGES.

XVI.

Coast and Ship Charges.

1. The coast charge and the ship charge shall be fixed in accordance with the tariff per word pure and simple, on the basis of a fair remuneration for radiotelegraphic work, with optional application of a minimum charge per radiotelegram.

The coast charge may not exceed 60 centimes per word, nor the ship charge 40 centimes per word. Nevertheless each Administration shall have the right to authorise coast and ship charges higher than these maxima in the case of stations having a range of more than 400 nautical miles, or of stations exceptionally onerous on account of the material conditions of their installation or working.

The optional minimum charge per radiotelegram may not exceed the coast or ship charge for a radiotelegram of 10 words.

2. In the case of radiotelegrams originating from or intended for a country or exchanged directly with the coast stations of that country, the charge applying to the transmission over the lines of the telegraph system must not exceed, on the average, that of the inland rate of that country.

This charge shall be reckoned per word pure and simple, with an optional minimum charge not exceeding the charge for 10 words. It shall be notified in francs by the Administration of the country to which the coast station is subject.

In the cases of countries in the European system, with the exception of Russia and Turkey, there shall only be a single charge for the territory of each country.

XVII.

Retransmission.

1. When a radiotelegram originating from a ship and intended for *terra firma* passes through one or two ship stations, the charge shall include, in addition to those of the ship of

origin, the coast station, and the telegraph system, the ship charge of each of the ships taking part in the transmission.

2. The sender of a radiotelegram originating from *terra firma* and intended for a ship may require that his message be transmitted by way of one or two ship stations; he shall deposit for this purpose the amount of the radiotelegraphic and telegraphic charges, and besides, as a deposit, a sum to be fixed by the office of origin with a view to the payment to the intermediate ship stations of the transit charges fixed in paragraph 1; he must further pay, as he may choose, either the charge for a telegram of five words or the cost of postage of a letter to be sent by the coast station to the office of origin giving the information necessary to the liquidation of the sum deposited.

The radiotelegram shall then be accepted at the risks and perils of the sender; it shall bear before the address the paid additional particulars "x retransmissions telegraphes" or "x retransmissions lettre" (x representing the number of retransmissions required by the sender) accordingly as the sender desires that the information necessary for the liquidation of the deposit be furnished by telegram or by letter.

3. The charge for radiotelegrams originating from a ship, intended for another ship, and sent by way of one or two intermediate coast stations, shall include:—

The ship charges of both ships, the charge of the coast station or the two coast stations, as the case may be, and when necessary the telegraph charge appropriate to the transit between the two coast stations.

4. The charge for radiotelegrams exchanged between ships without the aid of a coast station includes the ship charges of the ship of origin and of the ship of destination, with the ship charges of the intermediate stations added thereto.

5. The coast and ship charges due to the stations of transit shall be the same as those fixed for such stations when these are stations of origin and destination. In no case shall they be collected more than once.

6. In the case of any intermediate coast station, the charge to be collected for the transit service shall be the highest of the coast charges appertaining to the direct exchange with the two ships in question.

XVIII.

Origin of Telegrams.

The country in whose territory is established a coast station acting as intermediary for the exchange of radiotelegrams between a ship station and another country shall be regarded, for the purpose of applying telegraphic charges, as the country of origin or of destination of such radiotelegrams and not as the country of transit.

V.—COLLECTION OF CHARGES.

XIX.

Tariffs.

1. The total charge for radiotelegrams shall be collected from the sender, with the exception—1st, of the cost of express delivery (Article LVIII, paragraph 1, of the Telegraph Regulations); 2nd, of the charges applying to inadmissible joinings or alterations of words noted by the office or station of destination

(Article XIX, paragraph 9, of the Telegraph Regulations), these charges being collected from the addressee.

Ship stations must possess the necessary tariffs for this purpose. They shall have, however, the right to obtain information from coast stations with regard to charges for radiotelegrams for which they do not possess all the necessary information.

2. The counting of words by the office of origin shall be decisive in the case of radiotelegrams addressed to ships, and that of the ship station of origin shall be decisive in the case of radiotelegrams originating in ships, both for the purpose of transmission and for that of the international accounts. Nevertheless when the radiotelegram is worded wholly or in part either in one of the languages of the country of destination, in the case of radiotelegrams originating in ships, or in one of the languages of the country to which the ship belongs, in the case of radiotelegrams addressed to ships, and when the radiotelegram contains joinings or alterations of words contrary to the common use of that language, the office or ship station of destination, as the case may be, shall have the right to recover from the addressee the amount of the charge not collected. In the case of a refusal to pay the radiotelegram may be withheld.

VI.—TRANSMISSION OF RADIOTELEGRAMS.

A) SIGNALS OF TRANSMISSION.

XX.

Code.

The signals employed shall be those of the International Morse Code.

XXI.

Distress Signals.

Ships in distress shall make use of the following signal,

• • • — — — • • •

repeated at short intervals, followed by the necessary particulars.

As soon as a station hears the signal of distress, it must suspend all correspondence and must not resume the same until after it has made sure that the communication consequent upon the call for help is finished.

The stations that hear a call of distress must act according to indications given by the ship which makes the call, with regard to the order of messages or their cessation.

When, at the end of a series of distress calls, there is added the call signal of the particular station, the reply to the call is proper to that station only, unless that station does not reply. Failing the indication of a particular station in the call for help, every station that hears the call shall be bound to reply thereto.

XXII.

Information.

For the purpose of giving or asking information concerning the radiotelegraph service, stations must make use of the signals contained in the list appended to the present Regulations. (See p. 62.)

(B) ORDER OF TRANSMISSION.

XXIII.

Duration of Transmission.

Between two stations, radiotelegrams of the same class shall be retransmitted singly in

alternate order or by series of several radiotelegrams, according to the instructions given by the coast station, on condition that the duration of the transmission of each series does not exceed 15 minutes.

(C) CALLING OF STATIONS AND TRANSMISSION OF RADIOTELEGRAMS.

XXIV.

Calls.

1. As a general rule, it shall be the ship station that calls the coast station, whether it has radiotelegrams to transmit or not.

2. In waters where the radiotelegraphic traffic is congested (the Channel, etc.), the call of a ship to a coast station may not, as a general rule, be made unless the latter is within the normal range of the ship station and the ship station has approached to a distance less than 75 per cent. of the normal range of the coast station.

3. Before proceeding to make a call, the coast station or the ship station must adjust its receiving system to the highest possible degree of sensitiveness, and must make sure that no other communication is being made within its radius of action; if it is otherwise, it shall wait the first break, unless it finds that its call is not likely to disturb the communication in progress. The same applies when the station wishes to answer a call.

4. For making a call every station shall use the normal wave of the station to be called.

5. If, in spite of these precautions, a radiotelegraphic transmission be impeded, the call must cease on the first request made by a coast station open to public correspondence. This station must then indicate the approximate duration of the wait.

6. The ship station must make known to each coast station to which it has notified its presence the time at which it proposes to cease as operations, and also the probable duration of the interruption.

XXV.

Call Signals.

1. The call comprises the signal — • — • —, the call signal of the station called, sent three times, and the word "de," followed by the call signal of the sending station, sent three times.

2. The station called shall reply by giving the signal — • — • —, followed by the call signal, sent three times, of the calling station, by the word "de," its own call signal and the signal — • — • —.

3. Stations which wish to enter into communication with ships, without, however, knowing the names of those ships which are within their radius of action, may use the signal — • — • — • — • — (signal of enquiry). The provisions of paragraphs 1 and 2 are also applicable to the transmission of the signal of enquiry and to the reply to that signal.

XXVI.

Station failing to Reply.

If a station when called does not reply within the call (Regulation XXV) has been sent three times at intervals of 2 minutes, the call may not be resumed until after an interval of 15 minutes, the station making the call first making sure of the fact that no radiotelegraphic communication is in progress.

XXVII.

Use of High Power.

Every station which has to make a transmission necessitating the use of high power shall first send out three times the warning

signal — • — • —, with the minimum of power necessary to reach the neighbouring stations. It shall not then begin to transmit with the high power until 30 seconds after sending the warning signal.

XXVIII.

Particulars regarding Reception.

1. As soon as the coast station has replied, the ship station shall furnish it with the following information if it has messages to transmit to it; this information shall also be given when the coast stations ask for it:—

(a) The approximate distance, in nautical miles, of the vessel from the coast station;

(b) The position of the ship given in a concise form and adapted to the circumstances of the individual case;

(c) The next port at which the ship will touch;

(d) The number of radiotelegrams if they are of normal length or the number of words if the messages are of exceptional length.

The speed of the ship in nautical miles shall be given specially at the express request of the coast station.

2. The coast station shall reply giving, as provided in paragraph 1, either the number of telegrams or the number of words to be transmitted to the ship and also the order of transmission.

3. If transmission cannot take place immediately the coast station shall inform the ship station of the approximate length of the wait.

4. If a ship station when called cannot receive for the moment it shall inform the calling station of the approximate length of the wait.

5. In the case of exchanges between two ship stations it shall rest with the station called to fix the order of transmission.

XXIX.

Exchange of Messages.

When a coast station is called by several ship stations, it shall decide the order in which these stations shall be allowed to exchange their messages.

In the regulation of this order, the coast station shall be guided solely by the necessity for allowing every station concerned to exchange the greatest possible number of radiotelegrams.

XXX.

Order of Transmission.

Before beginning to exchange correspondence, the coast station shall inform the ship station whether the transmission is to be made in alternate order by series (Regulation XXIII); it shall then begin to transmit, or shall follow up these instructions by the signal — • — • —.

XXXI.

Initial and Final Signals

The transmission of a radiotelegram shall be preceded by the signal — • — • — and ended by the signal — • — • — followed by the call signal of the sending station and by the signal — • — • —.

In the case of a series of radiotelegrams, the call-letter of the sending station and the signal — • — • — shall only be given at the end of the series.

XXXII.

Lengthy Messages.

When the radiotelegram to be transmitted contains more than 40 words, the sending

station shall interrupt the transmission by the signal $\bullet \bullet \bullet \bullet \bullet$ after each series of 20 words or thereabouts, and it shall not resume transmission until after having obtained from the station in correspondence the repetition of the last word clearly received, followed by the said signal, or, if the reception is clear, the signal $\bullet \bullet \bullet$.

In the case of transmission in series, the acknowledgment of receipt shall be given after each radiotelegram.

Coast stations engaged in transmitting long radiotelegrams must suspend transmission at the end of each period of 15 minutes, and must remain silent during a period of 3 minutes before continuing transmission.

Coast and ship stations which work in the conditions laid down in Regulation XXXV, paragraph 2, must suspend work at the end of each period of 15 minutes, and keep watch on the wavelength of 600 metres during a period of 3 minutes before continuing transmission.

XXXIII.

Doubtful Messages.

1. When the signals become doubtful, all possible resources must be drawn upon to accomplish transmission. To this end, the radiotelegram shall be transmitted three times at most, at the request of the receiving station. If in spite of this triple transmission the signals are still unintelligible, the radiotelegram shall be cancelled.

If the acknowledgment of receipt does not come to hand, the sending station shall again call the station with which it is in correspondence. When no reply is made after three calls, the transmission shall not be persevered with. In such case, the sending station shall have the right to obtain the acknowledgment of receipt through the medium of another radiotelegraph station, using, when necessary, the lines of the telegraph system.

2. If the receiving station considers that, in spite of defective receiving, the radiotelegram can be delivered, it shall insert at the end of the preamble the service advice "Reception douteuse," and shall forward the radiotelegram. In such case, the Administration to which the coast station is subject shall claim the charges, in conformity with Clause XLII of the present Regulations. Nevertheless, if the ship station later on transmits the radiotelegram to another coast station of the same Administration, the latter can only claim the charges appertaining to a single transmission.

(D) ACKNOWLEDGMENT OF RECEIPT AND END OF WORK.

XXXIV.

Acknowledgment of Reception and Completion.

1. The acknowledgment of receipt shall be given in the form prescribed by the International Telegraph Regulations; it shall be preceded by the call signal of the sending station and followed by the call signal of the receiving station.

2. The end of the work between two stations shall be indicated by each one of them by means of the signal $\bullet \bullet \bullet \bullet \bullet$ followed by its own call signal.

(E) ROUTE TO BE TAKEN BY RADIOTELEGRAMS.

XXXV.

Route of Transmission.

1. As a general principle, the ship station shall transmit its radiotelegrams to the nearest coast station.

However, if the ship station has the choice between several coast stations at equal or nearly equal distances, it shall give the preference to that which is established on the territory of the country of destination or of normal transit of its radiotelegrams.

2. Nevertheless, a sender on board a ship shall have the right to indicate the coast station by which he wishes his radiotelegram to be forwarded. The ship station shall then wait until this coast station is the nearest.

Exceptionally, transmission may be made to a more distant coast station, provided:—

(a) that the radiotelegram is intended for the country in which such coast station is situated and that it comes from a ship subject to that country;

(b) that for calls and transmission both stations use a wavelength of 1,800 metres;

(c) that transmission by this wavelength does not disturb any transmission made, by means of the same wavelength, by a nearer coast station;

(d) that the ship station is more than 50 nautical miles distant from any coast station shown in the Nomenclature. The distance of 50 miles may be reduced to 25 miles, subject to the reservation that the maximum power at the terminals of the generator do not exceed 5 kilowatts and that the ship stations be established in conformity with Regulations VII and VIII. This reduction of distance shall not apply in the seas, bays, or gulfs of which the shores belong to one country only, and of which the opening to the high sea is less than 100 miles wide.

VII.—DELIVERY OF RADIO-TELEGRAMS.

XXXVI.

Delivery.

When for any cause whatsoever a radiotelegram coming from a ship at sea and intended for *terra firma* cannot be delivered to the addressee, an advice of non-delivery shall be sent out. This advice shall be transmitted to the coast station which received the original radiotelegram. The latter, after verifying the address, shall forward the advice to the ship, if possible, and, if need be, by way of another coast station of the same country or of a neighbouring country.

When a radiotelegram, having arrived at the ship station, cannot be delivered, that station shall inform the office or ship station of origin by means of a service advice. In the case of radiotelegrams coming from *terra firma* this advice shall be transmitted, whenever possible, to the coast station by way of which the radiotelegram passed, or, if necessary, to another coast station of the same country or of a neighbouring country.

XXXVII.

Non-Delivery.

If the ship to which the radiotelegram is addressed has not notified its presence to the coast station within the time specified by the sender, or, in the absence of such specification, up to the morning of the eighth day following, such coast station shall give notice of the fact to the office of origin, which shall inform the sender of the same.

This latter shall have the option of requiring by paid service advice, telegraphic or postal, addressed to the coast station, that his radiotelegram be kept for a fresh period of nine days,

for transmission to the ship, and so on. In the absence of such request the radiotelegram shall be returned as undelivered at the end of the ninth day (the day of handing in not to be included).

However, if the coast station is sure that the ship has left its radius of action before the station could have transmitted the radiotelegram to it, such station shall immediately inform the office of origin, which shall without delay advise the sender of the cancellation of the message. Nevertheless, the sender may, by paid service advice, request the coast station to transmit the radiotelegram when the ship next passes.

VIII.—SPECIAL RADIOTELEGRAMS.

XXXVIII.

Special Messages.

The following only shall be allowed :—

1st, *Reply Paid Radiotelegrams.*—These radiotelegrams shall bear, before the address, the indication, "Réponse payée," or "RP," completed by the mention of the amount paid in advance for the reply—for example: "Réponse payée fr. x," or "Rp. fr. x."

The reply voucher issued on board a ship shall give the right to send, up to the limit of its value, a radiotelegram to any address whatever from the ship station which issues such voucher.

2nd, *Collected Radiotelegrams.*

3rd, *Express Delivery Radiotelegrams.*—But only in cases in which the amount of the cost of express delivery is collected from the addressee. The countries which cannot adopt these radiotelegrams must notify the fact to the International Bureau. Radiotelegrams for express delivery, with collection of the cost from the sender, may be allowed when they are intended for the country in whose territory the corresponding coast station is situated.

4th, *Radiotelegrams for Delivery by Post.*

5th, *Multiple Radiotelegrams.*

6th, *Radiotelegrams with Acknowledgment of Receipt.*—But only with regard to notification of the date and time at which the coast station has transmitted to the ship station the telegram addressed to the latter.

7th, *Paid Service Advices.*—Except those asking for repetition of information. Nevertheless, all paid service advices shall be allowed on the route over the telegraph lines.

8th, *Urgent Radiotelegrams.*—But only in transmission over the telegraph lines, and subject to the application of the International Telegraph Regulations.

XXXIX.

Postal Radiotelegrams.

Radiotelegrams may be transmitted by a coast station to a ship, or by a ship to another ship, with the object of being forwarded by post, the posting to take place from a port of call of the receiving ship.

The address of these radiotelegrams must be drawn up as follows :—

1st, Paid instruction "poste," followed by the name of the port where the radiotelegram is to be posted ;

2nd, Full name and address of the addressee ;

3rd, Name of the ship station which is to carry out the posting ;

4th, When necessary, name of the coast station.

Example :—Poste Buenos Aires, Martinez, 14 Calle Prat, Valparaiso, Avon Lizard.

The charge shall include, as well as the radiotelegraph and telegraph charges, a sum of 25 centimes for the postage of the radiotelegram.

IX.—ARCHIVES.

XL.

Records.

The originals of radiotelegrams, as well as the documents relating thereto, retained by the Administrations, shall be kept with all necessary precautions in respect of secrecy for at least fifteen months, counting from the month following that in which the radiotelegrams were handed in.

These originals and documents shall be sent, as far as possible, at least once a month by the ship stations to the Administrations to which they are subject.

X.—REFUNDS AND REIMBURSEMENTS.

XLII.

Refund of Charges.

With regard to refunds and reimbursements, the provisions of the International Telegraph Regulations shall apply, bearing in mind the restrictions laid down in Clauses XXXVIII and XXXIX of the present Regulations and subject to the following reservations :—

The time occupied in radiotelegraphic transmission, and also the time during which the radiotelegram remains at the coast station in the case of radiotelegrams addressed to ships, or in the ship station in the case of radiotelegrams originating in ships, shall not be counted in the period of delay giving rise to refunds and reimbursements.

If the coast station informs the office of origin that a radiotelegram cannot be transmitted to the ship to which it is addressed, the Administration of the country of origin shall immediately initiate the reimbursement to the sender of the coast and ship charges in respect of such radiotelegram. In this case, the charges reimbursed shall not appear in the account for which provision is made by Regulation XLII, but the radiotelegram shall be mentioned therein as a memorandum.

Reimbursements shall be borne by the various Administrations and private enterprises which have taken part in the forwarding of the radiotelegram, each one of them relinquishing its share of the charge. Nevertheless, radiotelegrams falling under the provision of Articles VII and VIII of the Convention of St. Petersburg shall remain subject to the provisions of the International Telegraph Regulations, except when it is due to an error of service that such radiotelegrams have been accepted.

When the acknowledgment of receipt of a radiotelegram has not reached the station which transmitted the message, the charge shall not be refunded until it has been proved that the radiotelegram is one which gives occasion for reimbursement.

XI.—ACCOUNTING.

XLIII.

Accounts.

1. Coast and ship charges shall not be entered in the accounts provided for by the International Telegraph Regulations.

The accounts relating to these charges shall be settled by the Administrations of the countries concerned. They shall be prepared by the Administrations to which the coast stations belong, and communicated by them to the Administrations concerned. In cases in which the working of the coast stations is independent of the Administration of the country, the person working these stations may be substituted in respect of accounts for the Administration of such country.

2. As to transmission over the lines of the telegraph system the radiotelegram shall be treated in respect of accounts in conformity with the Telegraph Regulations.

3. In the case of radiotelegrams originating from ships the Administration to which the coast station is subject shall debit the Administration to which the ship station of origin is subject with the coast and ordinary telegraph charges, the total charges collected for prepaid replies, the coast and telegraph charges collected for collations, the charges appertaining to express delivery (in the case provided for in Regulation XXXVIII) or delivery by post, and with those collected for supplementary copies (TM). The Administration to which the coast station is subject shall credit, when the case arises, through the channel of the telegraph accounts and through the medium of the offices which have taken part in the transmission of the radiotelegrams, the Administration to which the office of destination is subject with the total charges relating to prepaid replies. With regard to telegraph charges and charges relating to express delivery or delivery by post, and to supplementary copies, the procedure shall be in conformity with the telegraph regulations, the coast station being regarded as the telegraph office of origin.

In the case of radiotelegrams intended for a country lying beyond that to which the coast station belongs, the telegraph charges to be liquidated conformably to the above provisions are those which arise either from tables "A" and "B" appended to the International Telegraph Regulations or from special arrangements concluded between the Administrations of adjoining countries and published by those Administrations and not the charges which might be made under the special provisions of Regulations XXIII (paragraph 1) and XXVII (paragraph 1) of the Telegraph Regulations.

In the case of radiotelegrams and paid-service advices addressed to ships, the Administration to which the office of origin is subject shall be debited directly by that to which the coast station is subject with the coast and ship charges. Nevertheless, the total charges appertaining to prepaid replies shall be credited, if there is occasion, from country to country through the channel of Administration to which the coast station is subject. In respect to the telegraph charges and charges relating to delivery by post and for supplementary copies, the procedure shall be in conformity with the telegraph regulations. The Administration to which the coast station is subject shall credit that to which the ship of destination is subject with the ship charge, if there is occasion, with the charges belonging to the intermediate ship stations, with the total charge collected for prepaid replies, with the ship charge relating to collation, and also with the charges made for preparing supplementary copies and for delivery by post.

The paid service advices, and the prepaid replies themselves, shall be treated, in the radiotelegraphic accounts, in all respects like other radiotelegrams.

In the case of radiotelegrams forwarded by means of one or two intermediate ship stations, each of the latter shall debit the ship station of origin, if the radiotelegram is one coming from a ship, or the ship station of destination if the radiotelegram is one intended for a ship, with the ship charge due to it for transit.

4. In principle the settlement of account appertaining to exchanges between ship stations shall be made directly as between the companies working those stations, the station of origin being debited by the station of destination.

5. The monthly accounts serving as a basis for the special accounting in respect of radiotelegrams shall be drawn up radiotelegram by radiotelegram, with all necessary particulars, and within a period of six months counting from the month to which they belong.

6. The Governments reserve to themselves the option of making between themselves and with private companies (contractors working radiotelegraphic stations, shipping companies, etc.) special arrangements with a view to the adoption of other provisions respecting accounts.

XII.—INTERNATIONAL BUREAU.

XLIII.

Expenses.

The supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 fcs. per annum, not including special expenses to which the meeting of an International Conference gives rise. The Administrations of the contracting States shall be, for the purposes of contribution towards the expenses, divided into six classes as follows:—

1st Class.—Union of South Africa, Germany, United States of America, Alaska, Hawaii, and the other American possessions in Polynesia, the Philippine Islands, Porto Rico and the American possessions in the Antilles, the zone of the Panama Canal, the Argentine Republic, Australia, Austria, Brazil, Canada, France, Great Britain, Hungary, British India, Italy, Japan New Zealand, Russia, Turkey.

2nd Class.—Spain.

3rd Class.—Russian Central Asia (littoral of the Caspian Sea), Belgium, Chili, Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung, Dutch Indies, Norway, Holland, Portugal, Roumania, Western Siberia (littoral of the Arctic Ocean), Eastern Siberia (littoral of the Pacific Ocean), Sweden.

4th Class.—Ex-German East Africa, Ex-German South-West Africa, The Cameroons, Togoland, Ex-German Pacific Protectorates, Denmark, Egypt, Indo-China, Mexico, Siam, Uruguay.

5th Class.—French West Africa, Bosnia-Herzegovina, Bulgaria, Greece, Madagascar, Tunis.

6th Class.—French Equatorial Africa, Portuguese West Africa, Portuguese East Africa and the Portuguese possessions in Asia, Bokhara, the Belgian Congo, the Colony of

Curaçao, the Spanish Colony of the Gulf of Guinea, Erythrea, Khiva, Morocco, Monaco, Persia, San Marino, Italian Somaliland.

XLIV.

Work of Berne Bureau.

The various Administrations shall forward to the International Bureau a form modelled on that hereto appended (see page 61) and containing the particulars enumerated in the form with regard to the stations covered by Clause V of the Regulations. Any modifications which may take place and additions shall be communicated by the Administrations to the International Bureau from the 1st to the 10th of each month. With the help of these communications the International Bureau will draw up the Nomenclature provided for by Regulation V. The Nomenclature shall be distributed to the Administrations concerned. It may also, with the supplements relating thereto, be sold to the public at cost price.

The International Bureau shall take care that the adoption of identical call signals for radiotelegraph stations be avoided.

XIII.—METEOROLOGICAL TRANSMISSIONS, TIME SIGNALS, AND OTHER TRANSMISSIONS.

XLV.

Meteorological and other Messages.

1. The Administrations shall take the necessary steps to supply their coast stations with meteorological telegrams containing the particulars of interest to the district of such stations. These telegrams, the text of which must not exceed twenty words, shall be sent to the ships which ask for them. The charge for these meteorological telegrams shall be carried to the account of the ships to which they are addressed.

2. The meteorological observations, made by certain ships appointed for that purpose by the country to which they belong, may be sent once a day as paid service advices to the coast stations authorised to receive them by the Administrations concerned, who shall also appoint the meteorological offices to which these observations shall be addressed by the coast station.

3. Time signals and meteorological telegrams shall be transmitted in succession one to another in such a way that the total duration of their transmission does not exceed ten minutes. In principle, while they are being sent, radiotelegraph stations, transmission by which might disturb the reception of these signals and telegrams, shall keep silent so as to allow all stations which desire to do so to receive these telegrams and signals. Exception shall be made in the case of distress calls and State telegrams.

4. The Administrations shall facilitate the communication to the marine information agencies which they may appoint of the information respecting wrecks and casualties at sea, or presenting a general interest for navigation, which the coast stations can communicate regularly.

XIV.—MISCELLANEOUS PROVISIONS.

XLVI.

Interference.

Transmission exchanged between ship stations must be carried out in such a way as not to interfere with the service of coast stations, as the latter must have, as a general rule, right of priority for public correspondence.

XLVII.

Compulsory Retransmission.

Coast stations and ship stations shall be bound to take part in the retransmission of radiotelegrams in cases in which communication cannot be established directly between the stations of origin and destination.

Nevertheless, the number of transmissions shall be limited to two.

In the case of radiotelegrams intended for *terra firma* use may only be made of retransmissions to reach the nearest coast station.

Retransmission shall be in all cases subject to the condition that the intermediate station which receives the radiotelegram in transit is in a position to send it on.

XLVIII.

Non-Contracting Governments.

If the transmission of a radiotelegram is carried out partly on the telegraph lines or through radiotelegraph stations belonging to a non-contracting Government, such radiotelegram may be sent forward, subject to the reservation that at least the Administrations to which these lines or stations belong shall have declared that they are willing to apply, when the case arises, the provisions of the Convention and of the Regulations, which are indispensable, in order that radiotelegrams may be regularly forwarded, and that accounting may be assured.

Such declaration shall be made to the International Bureau, and brought to the knowledge of the offices of the Telegraph Union.

XLIX.

Operation of Modifications to Regulations.

The modifications of the present Regulations which may be rendered necessary in consequence of the decisions of future Telegraph Conferences shall come into force on the date fixed for the application of the provisions decided upon by each one of these later Conferences.

L.

Application of International Telegraph Regulations.

The provisions of the International Telegraph Regulations shall apply by analogy to radiotelegraph correspondence in so far as they are not contrary to the provisions of the present Regulations.

The following in particular apply to radiotelegraph correspondence:—

The provisions of Article XXVII, paragraphs 3 to 6, of the Telegraph Regulations referring to the collection of charges; those of Articles XXXVI and XLI referring to the indication of the route to be taken; those of Articles LXXV, paragraph 1, LXXVIII, paragraphs 2 to 4, and LXXIX, paragraphs 2

to 4, relating to preparing of accounts. Nevertheless, first, the period of six months provided by paragraph 2 of Article LXXIX of the Telegraph Regulations for the verification of accounts is extended to nine months in the case of radiotelegrams; second, the provisions of Article XVI, paragraph 2, are not considered as authorising the free transmission by radiotelegraph stations of service telegrams relating exclusively to the telegraph service, nor the free transmission over the lines of the telegraph system of service telegrams relating exclusively to the radiotelegraph service; third, the provisions of Article LXXIX, paragraphs 3 and 5, do not apply to radiotele-

graph accounting. For the purposes of applying the provisions of the Telegraph Regulations coast stations shall be regarded as offices of transit, except when the Radiotelegraphic Regulations stipulate expressly that these stations are to be considered as offices of origin or destination.

Conformable to Article II of the Convention of London the present regulations will come into force on July 1st, 1913.

In witness whereof the respective Plenipotentiaries have signed these Regulations on a single copy, which will remain deposited in the Archives of the British Government, and of which a copy will be sent to each party.

APPENDIX

I.

TABLE REFERRED TO IN REGULATION XLIV (p. 60).

(a) COAST STATIONS.

Name.	Nationality.	Geographical Position. E=East longitude; O=West longitude; N=North latitude; S=South latitude. Territorial subdivisions.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wavelengths in Metres (the normal wavelength is underlined).
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Nature of Services effected.	Working hours (Time according to the Meridian).	Coast Charge.		Observations (if occasion, Time and Method of sending Time-Signals and Meteorological Telegrams).
		Per Word in Francs.	Minimum per Radiotelegram in Francs.	

(b) SHIP STATIONS.

Name.	Nationality.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wavelengths in Metres.
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Nature of Services effected.	Working Hours.	Ship Charge.		Observations (if occasion, Name and Address of the person working the Station).
		Per Word in Francs.	Minimum per Radiotelegram in Francs.	

1* WARSHIPS.

2* MERCHANT SHIPS.

II.

LIST OF ABBREVIATIONS TO BE USED IN RADIOTELEGRAPH TRANSMISSIONS
(referred to in Article XXII, p. 35).

Abbrevia- tion. 1.	Question. 2.	Answer or Advice. 3.
— • • • — (CQ)	.. .. .	Inquiry signal employed by a station which desires to correspond.
— • • • (TR)	.. .. .	Signal announcing the sending of indications concerning a ship station (Article XXVIII).
— — • • — (I)	.. .. .	Signal indicating that a station is about to send with high power.
PRB	Do you wish to communicate with my station by means of the International Signal Code?	I wish to communicate with your station by means of International Signal Code.
QRA	What is the name of your station?	This station is.....
QRB	How far are you from my station?	The distance between our station is..... nautical miles.
QRC	What are your true bearings?	My true bearings are.....degrees.
QRD	Where are you bound?	I am bound for.....
QRF	Where are you coming from?	I am coming from.....
QRG	To what company or line of navigation do you belong?	I belong to.....
QRH	What is your wavelength?	My wavelength is.....metres.
QRI	How many words have you to transmit?	I have.....words to transmit.
QRK	How are you receiving?	I am receiving well.
QRL	Are you receiving badly? Shall I transmit 20 times • • • • • so that you can adjust your apparatus.	I am receiving badly. Transmit 20 times • • • • • so that I can adjust apparatus.
QRM	Are you disturbed?	I am disturbed.
QRN	Are the atmospherics very strong?	The atmospherics are very strong.
QRO	Shall I increase my power?	Increase your power.
QRP	Shall I decrease my power?	Decrease your power.
QRQ	Shall I transmit faster?	Transmit faster.
QRS	Shall I transmit more slowly?	Transmit more slowly.
QRT	Shall I stop transmitting?	Stop transmitting.
QRU	—	I have nothing to transmit.
QRV	Are you ready?	I have nothing for you.
QRW	Are you busy?	I am ready. All is in order.
QRX	Shall I wait?	I am busy with another station (or with please do not interrupt).
QRY	What is my turn?	Wait. I will call you at.....o'clock (or when I want you).
QRZ	Are my signals weak?	Your turn is No.....
QSA	Are my signals strong?	Your signals are weak.
QSB	Is my tone bad?	Your signals are strong.
QSC	Is my spark bad?	The tone is bad.
QSD	Is the spacing bad?	The spark is bad.
QSF	Let us compare watches. My time is What is your time?	The spacing is bad.
QSG	Are the radiotelegrams to be transmitted alternately or in series?	The time is.....
QSH	—	Transmission will be in alternate order.
QSI	What is the charge to collect for....?	Transmission will be in series of five radiotelegrams.
QSK	Is the last radiotelegram cancelled?	Transmission will be in series of ten radiotelegrams.
QSL	Have you got the receipt?	The charge to collect is.....
QSM	What is your true course?	The last radiotelegram is cancelled.
QSN	Are you communicating with land?	Please give a receipt.
QSO	Are you in communication with another station (or with.....)?	My true course is.....degrees.
QSP	Shall I signal to that you are calling him?	I am not communicating with land.
QSQ	Am I being called by.....?	I am in communication with (through the medium of.....).
QSR	Will you dispatch the radiotelegram?	Inform that I am calling him.
QST	Have you received a general call?	You are being called by.....
QSU	Please call me when you have finished (or at.....o'clock)	I will forward the radiotelegram.
QSV	Is public correspondence engaged?	General call to all stations.
QSW	Must I increase the frequency of my spark?	I will call you when I have finished.
QSX	Must I diminish the frequency of my spark?	Public correspondence is engaged. Please do not interrupt.

Abbrevia- tion.	Question.	Answer or Advice.
1. QSY	2. Shall I transmit with a wavelength of .....metres?	3. Let us transfer to the wavelength of..... metres.
QSZ	.. .. .	Transmit each word twice. I have difficulty in receiving your signals.
QTA	.. .. .	Transmit each radiotelegram twice. I have difficulty in receiving your signals or Repeat the radiotelegram you have just sent. Reception doubtful.
QTC	Have you anything to transmit?	I have something to transmit. I have one (or several) radiotelegrams for..

When an abbreviation is followed by a mark of interrogation it applies to the question indicated in respect of that abbreviation.

In addition to these signals, which, it will be observed, are uniform in construction, the following signals of the International Telegraph Code may be used in these communications:—

• • — • • • "Repeat" sign (as well as mark of interrogation).
• • — • • • Understood.
• — • • • Wait.

EXAMPLES.

Station	
A	QRA ? What is the name of your station ?
B	QRA Campania This is the Campania.
A	QRG ? To what company or line of navigation do you belong ?
B	QRG Cunard. QRZ I belong to the Cunard Line. Your signals are weak.
Station A then increases the power of its transmitter and sends :—	
A	QRK ? How are you receiving ?
B	QRK I am receiving well.
	QRB 80 The distance between our stations is 80 nautical miles.
	QRC 62 My true bearings are 62 degrees, etc.

The following States have subsequently adhered to the Convention but were not represented thereat :—

Bolivia	New Caledonia
Colombia	Newfoundland
Cuba	Norfolk Island
Cyrenaica	Panama
Czecho-Slovakia	Papua
Ecuador	Peru
French Oceania	Sarawak
Guadeloupe	Tonga Islands
Guatemala	Tripoli
Iceland	Venezuela
Martinique	Zanzibar
Mexico	

INTERNATIONAL CONVENTION ON SAFETY OF LIFE AT SEA

London, January 20th, 1914.

THE London International Conference on the Safety of Life at Sea, by which the Convention signed on January 20th, 1914, has been drawn up, met for the first time on November 12th, 1913, at the Foreign Office, London. The suggestion that such a Conference should be held emanated from the ex-German Emperor, and the task of convening it was undertaken by the British Government. The following States were represented: Great Britain, Germany, the United States, Australia, Austria-Hungary, Belgium, Canada, Denmark, Spain, France, Italy, Japan, Norway, the Netherlands, Russia, Sweden, and New Zealand. The delegations from the different States, were composed, not of the representatives of the shipping trade, but of administrators, experts and jurists.

The late Lord Mersey was appointed Chairman of the Conference. To deal with the specific subjects submitted to it the Conference appointed five sub-committees, together with a sixth sub-committee for drafting the Convention, which was to embody the recommendations of the Committees as approved by the whole Conference.

The Convention contains seventy-four articles, of which we present below the articles governing the use of wireless telegraphy:—

CHAPTER I.

SAFETY OF LIFE AT SEA.

Article 1.—The High Contracting Parties undertake to give effect to the provisions of this Convention, for the purpose of securing safety of life at sea, to promulgate all regulations and to take all steps which may be necessary to give the Convention full and complete effect.

The provisions of this Convention are completed by Regulations which have the same force and take effect at the same time as the Convention. Every reference to the Convention implies at the same time a reference to the Regulations annexed thereto.

CHAPTER II.

SHIPS TO WHICH THIS CONVENTION APPLIES.

Article 2.—Except where otherwise provided by this Convention, the merchant ships of any of the States of the High Contracting Parties, which are mechanically propelled, which carry more than 12 passengers, and which proceed from a port of one of the said States to a port situated outside that State, or conversely, are subject to the provisions of this Convention. Ports situated in the Colonies, Possessions, or Protectorates of the High Contracting Parties are considered to be ports outside the States of the High Contracting Parties.

Persons who are on board by reason of *force majeure* or in consequence of the obligation laid upon the master to carry ship-

wrecked or other persons, are not deemed to be passengers.

Article 3.—There are excepted from this Convention, save in the cases where the Convention otherwise provides, ships making voyages specified in a schedule to be communicated by each High Contracting Party to the British Government at the time of ratifying the Convention.

No schedule may include voyages in the course of which the ships go more than 200 sea miles from the nearest coast.

Each High Contracting Party has the right subsequently to modify its schedule of voyages in conformity with this Article on condition that it notifies the British Government of such modification.

Each High Contracting Party has the right to claim from another Contracting Party the benefit of the privileges of the Convention for all of its ships which are engaged in any one of the voyages mentioned in its own schedule. For this purpose the Party claiming such benefit shall impose on the said ships the obligations prescribed by the Convention in so far as, having regard to the nature of the voyage, these obligations would not be unnecessary or unreasonable.

Article 4.—No ship, not subject to the provisions of the Convention at the time of its departure, can be subjected to the Convention in the course of its voyage if stress of weather or any other cause of *force majeure* compels it to take refuge in a port of one of the States of the High Contracting Parties.

CHAPTER III.

SAFETY OF NAVIGATION.

Article 5.—When the expression “every ship” is used in this chapter and in the corresponding part of the annexed Regulations it includes all merchant ships, whether they are the ships defined in Article 2 or not, which belong to any of the Contracting States.

Article 6.—The High Contracting Parties undertake to take all steps to ensure the destruction of derelicts in the northern part of the Atlantic Ocean east of a line drawn from Cape Sable to a point situated in latitude 34° north and longitude 70° west. Further, they will establish in the North Atlantic with the least possible delay a service for the study and observation of ice conditions and a service of ice patrol. For this purpose:

Two vessels shall be charged with these three services.

During the whole of the ice season they shall be employed in ice patrol.

During the rest of the year the two vessels shall be employed in the study and observation of ice conditions and in the destruction of derelicts; nevertheless the study and observation of ice conditions shall be effectively maintained, in particular from the beginning of February to the opening of the ice season.

While the two vessels are employed in ice patrol the High Contracting Parties, to the extent of their ability and so far as the exigencies of the Naval Service will permit, will send warships or other vessels to destroy any dangerous derelicts, if this destruction is considered necessary at that time.

Article 7.—The Government of the United States is invited to undertake the management of the three services of derelict destruction, study and observation of ice conditions, and ice patrol. The High Contracting Parties which are specially interested in these services, and whose names are given below, undertake to contribute to the expense of establishing and working the said services in the following proportions:—

	Per cent.
Austria-Hungary	2
Belgium	4
Canada	2
Denmark	2
France	15
Germany	15
Great Britain	30
Italy	4
Netherlands	4
Norway	3
Russia	2
Sweden	2
United States of America ..	15

Each of the High Contracting Parties has the right to discontinue its contribution to the expense of working these services after September 1st, 1916. Nevertheless, the High Contracting Party which avails itself of this right will continue responsible for the expenses of working up to the 1st September following the date of denunciation of the Convention on this particular point. To take advantage of the said right, it must give notice to the other Contracting Parties at least six months before the said 1st September; so that, to be free from its obligations on September 1st, 1916, it must give notice on March 1st, 1916, at the latest, and similarly for each subsequent year.

In case the United States Government should not accept the proposal made to them,

or in case one of the High Contracting Parties, for any reason, should not assume responsibility for the pecuniary contribution defined above, the High Contracting Parties shall settle the question in accordance with their mutual interests.

The Government of the High Contracting Party which undertakes the management of the service of derelict destruction is invited to devise means of granting, at the expense of this service, to merchant ships, which have contributed in an effective manner to the destruction of ocean derelicts, rewards to be fixed by the Government in accordance with the services rendered.

The High Contracting Parties which contribute to the cost of the three above-mentioned services shall have the right by common consent to make from time to time such alterations in the provisions of this Article and of Article 6 as appear desirable.

Article 8.—The master of every ship which meets with dangerous ice or a dangerous derelict is bound to communicate the information by all the means of communication at his disposal to the ships in the vicinity, and also to the competent authorities at the first point of the coast with which he can communicate.

Every Administration which receives intelligence of dangerous ice or a dangerous derelict shall take all steps which it thinks necessary for bringing the information to the knowledge of those concerned and for communicating it to the other Administrations.

The transmission of the messages respecting ice and derelicts is free of cost to the ships concerned.

It is desirable that the said information should be sent in a uniform manner. For this purpose a code, the use of which is optional, appears in Article I of the Regulations annexed hereto.

Article 9.—The master of every ship fitted with a radiotelegraph installation, on becoming aware of the existence of an imminent and serious danger to navigation, shall report it immediately in the manner prescribed by Article II of the Regulations annexed hereto.

Article 10.—When ice is reported on, or near his course, the master of every ship is bound to proceed at night at a moderate speed, or to alter his course so as to go well clear of the danger zone.

Article 11.—The ships defined by Article 2 shall have on board a Morse signalling lamp of sufficient range.

The use of Morse signals is regulated by the Code appearing in Article III, as well as by Article IV of the Regulations annexed hereto.

Article 12.—The use of the international distress signals for any other purpose than that of signals of distress is prohibited on every ship.

The use of private signals which are liable to be confused with the international distress signals is prohibited on every ship.

Article 13.—The selection of the routes across the North Atlantic in both directions is left to the responsibility of the steamship companies. Nevertheless the High Contracting Parties undertake to impose on these companies the obligation to give public notice of the regular routes which they propose their vessels should follow, and of any changes which they make in them.

The High Contracting Parties undertake, further, to use their influence to induce the

owners of all vessels crossing the Atlantic to follow as far as possible the routes adopted by the principal companies.

Article 14.—The High Contracting Parties undertake to use all diligence to obtain from the Governments which are not parties to this Convention their agreement to the revision of the International Regulations for Preventing Collisions at Sea as indicated below:—

(A) The Regulations shall be completed or revised in regard to the following points:

- (1) The second white light.
- (2) The stern light.
- (3) A day signal for motor vessels.
- (4) A sound signal for a vessel towed.
- (5) The prohibition of signals similar to distress signals.

(B) Articles 2, 10, 14, 15, 31 of the said Regulations shall be amended in accordance with the following provisions:

Article 2. The second white mast-head light to be compulsory.

Article 10. A permanent fixed stern light to be compulsory.

Article 14. A special day signal to be compulsory for motor vessels.

Article 15. A special sound signal to be established for use by a vessel in tow, or if the tow is composed of several vessels, by the last vessel of the tow.

Article 31. Article 31 to be modified in the following manner: Add to the lists of both day and night signals the international radiotelegraph distress signal.

Article 15.—The Governments of the High Contracting Parties undertake to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that from the point of view of safety of life at sea, the ships defined in Article 2 shall be sufficiently and efficiently manned.

Chapter IV, which contains Articles 16 to 30, refers to construction.

CHAPTER V.

RADIOTELEGRAPHY.

Article 31.—All merchant ships belonging to any of the Contracting States, whether they are propelled by machinery or by sails, and whether they carry passengers or not, shall, when engaged on the voyages specified in Article 2, be fitted with a radiotelegraph installation if they have on board fifty or more persons in all.

Advantage may not be taken of the provisions of Articles 2 and 3 of this Convention to exempt a ship from the requirements of this chapter.

Article 32.—Ships on which the number of persons on board is exceptionally and temporarily increased up to or beyond fifty as the result of *force majeure*, or because the master is under the necessity of increasing the number of his crew to fill the places of those who are ill, or is obliged to carry shipwrecked or other persons, are exempted from the above obligation.

Moreover, the Governments of each of the Contracting States, if they consider that the route and the conditions of the voyage are such as to render a radiotelegraph installation unreasonable or unnecessary, may exempt from the above requirement the following ships:—

- (1) Ships which in the course of their voyage do not go more than 150 sea miles from the nearest coast.
- (2) Ships on which the number of persons

on board is exceptionally or temporarily increased up to or beyond fifty by the carriage of cargo hands or a part of the voyage, provided that the said ships are not going from one Continent to another, and, that, during that part of their voyage, they remain within the limits of latitude 30° N. and 30° S.

(3) Sailing vessels of primitive build, such as *dhows*, *junks*, etc., if it is practically impossible to instal a radiotelegraph apparatus.

Article 33.—Ships which, in accordance with Article 31 above, are required to be fitted with a radiotelegraph installation are divided, for the purpose of radiotelegraph service, into three classes, in accordance with the classification established for ship stations in Article XIII (b) of the Regulations annexed to the Radiotelegraph Convention, signed in London on July 5th, 1912, viz:—

First Class.—Ships having a continuous service.

There shall be placed in the First Class ships which are intended to carry twenty-five or more passengers:—

(1) if they have an average speed in service of fifteen knots or more;

(2) if they have an average speed in service of more than thirteen knots, but only subject to the twofold condition that they have on board two hundred persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than 500 sea miles between any two consecutive ports. Nevertheless these ships may be placed in the Second Class on condition that they have a continuous watch.

Second Class.—Ships having a service of limited duration.

There shall be placed in the Second Class all ships which are intended to carry twenty-five or more passengers, if they are not, for other reasons, placed in the First Class.

Ships placed in the Second Class must, during navigation, maintain a continuous watch for at least seven hours a day, and a watch of ten minutes at the beginning of every other hour.

Third Class.—Ships which have no fixed periods of service.

All ships which are placed neither in the First nor in the Second Class shall be placed in the Third Class.

The owner of a ship placed in the Second or in the Third Class has the right to require that, if the ship complies with all the requirements for a superior class, a statement to the effect that it belongs to that superior class shall be inserted in the Safety Certificate.

Article 34.—Ships which are required by Article 31 above to be fitted with a radiotelegraph installation shall be required, by the Government of the countries to which they belong, to maintain a continuous watch during navigation as soon as the said Governments consider that it will be of service for the purpose of safety of life at sea.

Meanwhile, the High Contracting Parties undertake to require, from the date of the ratification of the present Convention, subject to the delays specified below, a continuous watch on the following ships:—

- (1) Ships whose average speed in service exceeds thirteen knots, which have on board 200 persons or more, and which, in the course of their voyage, go a distance of more than 500 sea miles between two

consecutive ports, when these ships are placed in the Second Class.

(2) Ships in the Second Class, for the whole of the time during which they are more than 500 sea miles from the nearest coast.

(3) Other ships specified in Article 31, when they are engaged in the Trans-Atlantic trade, or when they are engaged in other trades if their route takes them more than 1,000 sea miles from the nearest coast.

Ships connected with all kinds of fishing business, including whaling, which are required to be fitted with a radiotelegraph installation, shall not be required to maintain a continuous watch.

The continuous watch may be kept by one or more operators, holding certificates in accordance with Article X of the Regulations annexed to the International Radiotelegraph Convention, 1912, together, if necessary, with one or more certificated watchers. Nevertheless, if an efficient automatic calling apparatus is invented, the continuous watch may be maintained by this means by agreement between the Governments of the High Contracting Parties.

By "certificated watcher" is meant any person holding a certificate issued under the authority of the Administration concerned. To obtain this certificate, the applicant must prove that he is capable of receiving and understanding the radiotelegraph distress signal and the safety signal described in the Regulations annexed hereto.

The High Contracting Parties undertake to take steps to ensure that the certificated watchers observe the secrecy of correspondence.

Article 35.—The radiotelegraph installations required by Article 31 above shall be capable of transmitting clearly perceptible signals from ship to ship over a range of at least 100 sea miles by day under normal conditions and circumstances.

Every ship which is required, in conformity with the provisions of Article 31 above, to be fitted with a radiotelegraph installation, shall, whatever be the class in which it is placed, be provided in accordance with Article XI of the Regulations annexed to the International Radiotelegraph Convention, 1912, with an emergency installation, every part of which is placed in a position of the greatest possible safety to be determined by the Government of the country to which the ship belongs.

In all cases the emergency installation must be placed, in its entirety, in the upper part of the ship, as high as practically possible.

The emergency installation includes, as provided by Article XI of the Regulations annexed to the International Radiotelegraph Convention, 1912, an independent source of energy capable of being put into operation rapidly and of working for at least six hours with a minimum range of eighty sea miles for ships in the First Class and fifty sea miles for ships in the two other classes.

If the normal installation, which, in accordance with this Article, has a range of at least 100 sea miles, satisfies all the conditions prescribed above, an emergency installation is not required.

The licence provided for in Article IX of the Regulations annexed to the International Radiotelegraph Convention, 1912, may not be issued unless the installation complies both with the provisions of that Con-

vention and also with the provisions of this Convention.

Article 36.—The matters governed by the International Radiotelegraph Convention, 1912, and the Regulations annexed thereto, and in particular the radiotelegraph installations on ships, the transmission of messages, and the certificates of the operators, remain and will continue subject to the provisions:

(1) of that Convention and the Regulations annexed thereto, or of any other instruments which may in the future be substituted therefor;

(2) of this Convention, in regard to all the points in which it supplements the aforementioned documents.

Article 37.—Every master of a ship who receives a call for assistance from a vessel in distress is bound to proceed to the assistance of the persons in distress.

Every master of a vessel in distress has the right to requisition from among the ships which answer his call for assistance the ship or ships which he considers best able to render him assistance, but he must exercise this right only after consultation, so far as may be possible, with the masters of those ships. Such ships are then bound to comply immediately with the requisition by proceeding with all speed to the assistance of the persons in distress.

The masters of the ships which are required to render assistance are released from this obligation as soon as the master or masters requisitioned have made known that they will comply with the requisition, or as soon as the master of one of the ships which has reached the scene of the casualty has made known to them that their assistance is no longer necessary.

If the master of a ship is unable, or considers it unreasonable or unnecessary, in the special circumstances of the case, to go to the assistance of the vessel in distress, he must immediately inform the master of the vessel in distress accordingly. Moreover, he must enter in his log book the reasons justifying his action.

The above provisions do not prejudice the International Convention for the unification of certain rules with respect to Assistance and Salvage at Sea, signed at Brussels on September 23rd, 1910, and in particular, the obligation to render assistance laid down in Article II of that Convention.

Article 38.—The High Contracting Parties undertake to take all steps necessary for giving effect to the provisions of this chapter with the least possible delay. Nevertheless, they may allow:

A delay not exceeding one year, from the date of the ratification of this Convention, for the provision and training of operators and for the installation of the apparatus on ships placed in the First and Second Classes.

A delay not exceeding two years, from the date of the ratification of this Convention, for the provision and training of the operators and watchers on the ships in the Third Class, for the installation of the apparatus on ships in the Third Class and for the establishment of a continuous watch on ships placed in the Second and Third Classes.

Chapter VI refers to Life-saving Appliances and Fire Protection.

REGULATIONS. SAFETY OF NAVIGATION.

ARTICLE I.

CODE FOR THE TRANSMISSION BY RADIOTELEGRAPHY OF INFORMATION RELATING TO ICE, DERELICTS, AND WEATHER.

INSTRUCTIONS.

Transmission of Information.—The transmission of information concerning ice and derelicts is obligatory. This information may be sent from ship to ship or to the Hydrographic Office, Washington, either in clear or by means of the abbreviations used in Part I of this Code.

The transmission of information relating to weather is optional. Part II of this Code may be used for this purpose, but may be modified at any time by the Meteorological Congress.

Information required :

PART I.—ICE AND DERELICTS.

1. The kind of ice or derelict observed.
2. The position of ice or derelict when last determined.

PART II.—METEOROLOGICAL INFORMATION.

1. The direction and force of the wind.
2. The set and velocity of the current.
3. Weather or state of the sky at a fixed hour.
4. Height of barometer and air temperature.
5. Barometric tendency and sea-surface temperature.

The time to be adopted :

In all radiotelegrams relating to ice or derelicts the time shall be given in Greenwich mean time.

The Address :

Reports, when sent to the Hydrographic Office, Washington, should be addressed "Hydrographic"; reports to the Meteorological Office, London, should be addressed "Meteorology."

The Message :

1. When sending information about ice or derelicts alone, two groups of five figures each are used, preceded by the word "ice"; these groups may be repeated as often as necessary.
2. If meteorological information is to be sent in addition, a further four groups of five figures each are used, preceded by the word "weather." These groups are inserted at the end of the message after all the information relating to ice has been given.

N.B.—If the message contains the word "weather," all the code groups before that word give information relating to ice, and those after the word "weather" give meteorological information. If there is no word "weather" in the message, it only contains information about ice. (See examples of the two kinds of message given in this Article.)

PART I.

ICE AND DERELICTS.

Information respecting ice and derelicts is given by means of ten figures divided into two groups of five figures each. These groups are preceded by the word "ice."

- | | |
|---------------------|---|
| Two figures | The day of the month (<i>dd</i>), according to Code I. |
| One figure | The time of observation (<i>T</i>), according to Code II. |
| One figure | The kind of ice observed (<i>I</i>), according to Code III. |
| Three figures | The latitude of the ice observed (<i>p p p</i>), to tenths of a degree (see table below). |
| Three figures.. .. | The longitude of the ice observed (<i>p' p' p'</i>), to tenths of a degree (see table below). |

The first group consists of *ddTIp*.

The second group consists of *ppp'p'p'*.

Safety of Life at Sea

CODES.

CODE I.—Day of the Month.

The day of the month is given by two figures, of which the first may be zero: 01 to 31.

Code II.—Time of Observation.

The time of observation is included between—
Greenwich Mean Time

	Code No.
1 a.m. and 4 a.m.	1
4 a.m. and 7 a.m.	2
7 a.m. and 10 a.m.	3
10 a.m. and 1 p.m.	4
1 p.m. and 4 p.m.	5
4 p.m. and 7 p.m.	6
7 p.m. and 10 p.m.	7
10 p.m. and 1 a.m.	8

Code III.—Nature of Ice or Derelict Observed.

- No ice observed.
- Single iceberg. Huge mass of floating ice.
- Several icebergs.
- Numerous icebergs.
- Floeberg. Thick piece of salt-water ice like a small iceberg.
- Field ice. Ice extending as far as the eye can reach, but through which it is possible to navigate.
- Pack ice. Pieces of ice broken from berg or floe, partly closed together.
- Land ice. Ice attached to the shore since the winter.
- Derelict.
- (Not allotted.)

EXAMPLE.

Message sent from Ship to Ship.

	First Message.	Coded as	Second Message.	Coded as	Third Message.	Coded as	Fourth Message.	Coded as
Date of observation	15	15	15	15	15	15	16	16
Time of observation	10 a.m.—1 p.m.	4	4 p.m.—7 p.m.	6	7 p.m.—10 p.m.	7	4 p.m.—7 a.m.	2
Nature of ice or derelict	Field	5	Numerous icebergs	3	Derelict	8	Single iceberg	1
Position of ice or derelict	Latitude 45° 42' Longitude 46° 11'	457 462	Latitude 46° 5' Longitude 44° 40'	461 447	Latitude 46° 25' Longitude 43° 58'	464 440	Latitude 47° 19' Longitude 40° 15'	473 402

The code of the above message would thus be :
S.S. to S.S.

Ice, 15454, 57462 : 15634, 61447 : 15784, 64440 : 16214, 73402.

PART II.

METEOROLOGICAL INFORMATION.

Information respecting weather, etc., is given by four groups of five figures each. These groups are preceded by the word "weather."
First Group (DDPPP) :
The day of the month : two figures (DD), according to Code I.
The position of the ship when transmitting the message, indicated by three figures (PPP), representing the 1° square in which the ship is situated, according to Code IV and the numbered chart annexed to this Article.
Second Group (WWCCX) :
Wind direction and force at 8 a.m. at the 75th meridian of west longitude : two figures (WW), according to Code V.
Set and velocity of current : two figures (CC), according to Code VI.
Weather or state of the sky at the same hour : one figure (X), according to Code VII.

Third Group (BBBAA) ;

The barometric height to tenths of a millimetre at 8 a.m. at the 75th meridian of west longitude : three figures (BBB), according to Code VIII.

Air temperature at the same hour : two figures (AA), according to Code IX.

Fourth Group (bbSSS) ;

Barometric tendency at 8 a.m. at the 75th meridian of west longitude : two figures (bb), according to Code X.

Sea surface temperature at the same hour : three figures (SSS), according to Code XI.

CODES.**Code IV.—Position of Ship.**

A chart gives the numbers to be assigned to each 1° square in the North Atlantic. The position of the ship, when the meteorological data given in Part II were observed, is indicated by the three figures representing the 1° square in which the ship is situated. For example : A position 51° 55' N., 26° 49' W. would be reported as 561.

Code V.

Wind Direction (to 16 points) and **Wind Force** at 8 a.m. mean time at the 75th meridian of west longitude (WW).

	Wind Force. Beaufort Scale.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	N.
Calm	0	00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Light breeze ..	1, 2 or 3	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
Moderate breeze ..	4 or 5	02	08	14	20	26	32	38	44	50	56	62	68	74	80	86	92
Strong wind ..	6 or 7	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
Gale force ..	8 or 9	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
Storm force ..	10 or 11	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
Hurricane ..	12	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96

N.B.—The wind direction is to be referred to true bearings.

Code VI.

Direction (to 16 points) and **Velocity of the Current** (CC).

Nautical Miles per hour.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E.	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	N.
0.25	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
0.5	02	09	14	20	26	32	38	44	50	56	62	68	74	80	86	92
1	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
2	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
3	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
4	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
00	No current.															
99	No observation.															

N.B.—The current is to be referred to true bearings.

Code VII.

The State of the Sky at 8 a.m. mean time at the 75th meridian of west longitude :

0. Sky quite clear.
1. Sky quarter clouded.
2. Sky half clouded.
3. Sky three-quarters clouded.
4. Sky entirely overcast.
5. Rain falling.

6. Snow or hail falling.
7. Haze or mist.
8. Fog.
9. Thunderstorm.

Code VIII.—*Height of Barometer.*

The reading of the mercury barometer is to be corrected for index error, and reduced to 0° C. and sea level. A table of corrections is given below.

The corrected reading is coded by omitting the first figure of the barometer reading in tenths of a millimetre: for example, 761.2 mm. is coded 612.

A table for converting hundredths of an inch to tenths of a millimetre is given below.

Code IX.

Air Temperature is coded in two figures according to the following table:—

Degrees Centigrade.	Degrees Fahrenheit.	Code No.	Degrees Centigrade.	Degrees Fahrenheit.	Code No.
-15.0	5.0	00	10.0	50.0	50
-14.5	5.9	01	10.5	50.9	51
-14.0	6.8	02	11.0	51.8	52
-13.5	7.7	03	11.5	52.7	53
-13.0	8.6	04	12.0	53.6	54
-12.5	9.5	05	12.5	54.5	55
-12.0	10.4	06	13.0	55.4	56
-11.5	11.3	07	13.5	56.3	57
-11.0	12.2	08	14.0	57.2	58
-10.5	13.1	09	14.5	58.1	59
-10.0	14.0	10	15.0	59.0	60
-9.5	14.9	11	15.5	59.9	61
-9.0	15.8	12	16.0	60.8	62
-8.5	16.7	13	16.5	61.7	63
-8.0	17.6	14	17.0	62.6	64
-7.5	18.5	15	17.5	63.5	65
-7.0	19.4	16	18.0	64.4	66
-6.5	20.3	17	18.5	65.3	67
-6.0	21.2	18	19.0	66.2	68
-5.5	22.1	19	19.5	67.1	69
-5.0	23.0	20	20.0	68.0	70
-4.5	23.9	21	20.5	68.9	71
-4.0	24.8	22	21.0	69.8	72
-3.5	25.7	23	21.5	70.7	73
-3.0	26.6	24	22.0	71.6	74
-2.5	27.5	25	22.5	72.5	75
-2.0	28.4	26	23.0	73.4	76
-1.5	29.3	27	23.5	74.3	77
-1.0	30.2	28	24.0	75.2	78
-0.5	31.1	29	24.5	76.1	79
0.0	32.0	30	25.0	77.0	80
0.5	32.9	31	25.5	77.9	81
1.0	33.8	32	26.0	78.8	82
1.5	34.7	33	26.5	79.7	83
2.0	35.6	34	27.0	80.6	84
2.5	36.5	35	27.5	81.5	85
3.0	37.4	36	28.0	82.4	86
3.5	38.3	37	28.5	83.3	87
4.0	39.2	38	29.0	84.2	88
4.5	40.1	39	29.5	85.1	89
5.0	41.0	40	30.0	86.0	90
5.5	41.9	41	30.5	86.9	91
6.0	42.8	42	31.0	87.8	92
6.5	43.7	43	31.5	88.7	93
7.0	44.6	44	32.0	89.6	94
7.5	45.5	45	32.5	90.5	95
8.0	46.4	46	33.0	91.4	96
8.5	47.3	47	33.5	92.3	97
9.0	48.2	48	34.0	93.2	98
9.5	49.1	49	34.5	94.1	99

Code X.—*Barometric Tendency.*

By the "barometric tendency at a given hour" is meant the amount by which the barometric height has changed during the preceding three

hours. It is to be expressed in millimetres. For example, the barometric tendency at 8 a.m. could be obtained by comparing the reading taken at that hour, say 755.7 mm., with a reading taken at 5 a.m., say 759.3 mm. In this case the barometric tendency would be expressed by a fall of 3.6 millimetres. As a general rule the barometric tendency is to be determined from the trace of the barograph.

The barometric tendency is coded in two figures, according to the following table :—

Rise in Barometer.		Code No.	Fall in Barometer.		Code No.
Millimetres.	Inches.		Millimetres.	Inches.	
0.0—0.4	0.00—0.01	01	0.0—0.4	0.00—0.01	51
0.5—0.9	0.02—0.03	02	0.5—0.9	0.02—0.03	52
1.0—1.4	0.04—0.05	03	1.0—1.4	0.04—0.05	53
1.5—1.9	0.06—0.07	04	1.5—1.9	0.06—0.07	54
2.0—2.4	0.08—0.09	05	2.0—2.4	0.08—0.09	55
2.5—2.9	0.10—0.11	06	2.5—2.9	0.10—0.11	56
3.0—3.4	0.12—0.13	07	3.0—3.4	0.12—0.13	57
3.5—3.9	0.14—0.15	08	3.5—3.9	0.14—0.15	58
4.0—4.4	0.16—0.17	09	4.0—4.4	0.16—0.17	59
4.5—4.9	0.18—0.19	10	4.5—4.9	0.18—0.19	60
5.0—5.4	0.20—0.21	11	5.0—5.4	0.20—0.21	61
5.5—5.9	0.22—0.23	12	5.5—5.9	0.22—0.23	62
6.0—6.4	0.24—0.25	13	6.0—6.4	0.24—0.25	63
6.5—6.9	0.26—0.27	14	6.5—6.9	0.26—0.27	64
7.0—7.4	0.28—0.29	15	7.0—7.4	0.28—0.29	65
7.5—7.9	0.30—0.31	16	7.5—7.9	0.30—0.31	66
8.0—8.4	0.32—0.33	17	8.0—8.4	0.32—0.33	67
8.5—8.9	0.34—0.35	18	8.5—8.9	0.34—0.35	68
9.0—9.4	0.36—0.37	19	9.0—9.4	0.36—0.37	69
9.5—9.9	0.38—0.38	20	9.5—9.9	0.38—0.38	70
10.0—10.4	0.39—0.40	21	10.0—10.4	0.39—0.40	71
10.5—10.9	0.41—0.42	22	10.5—10.9	0.41—0.42	72
11.0—11.4	0.43—0.44	23	11.0—11.4	0.43—0.44	73
11.5—11.9	0.45—0.46	24	11.5—11.9	0.45—0.46	74
12.0—12.4	0.47—0.48	25	12.0—12.4	0.47—0.48	75
12.5—12.9	0.49—0.50	26	12.5—12.9	0.49—0.50	76
13.0—13.4	0.51—0.52	27	13.0—13.4	0.51—0.52	77
13.5—13.9	0.53—0.54	28	13.5—13.9	0.53—0.54	78
14.0—14.4	0.55—0.56	29	14.0—14.4	0.55—0.56	79
14.5—14.9	0.57—0.58	30	14.5—14.9	0.57—0.58	80
15.0—15.4	0.59—0.60	31	15.0—15.4	0.59—0.60	81
15.5—15.9	0.61—0.62	32	15.5—15.9	0.61—0.62	82
16.0—16.4	0.63—0.64	33	16.0—16.4	0.63—0.64	83
16.5—16.9	0.65—0.66	34	16.5—16.9	0.65—0.66	84
17.0—17.4	0.67—0.68	35	17.0—17.4	0.67—0.68	85
17.5—17.9	0.69—0.70	36	17.5—17.9	0.69—0.70	86
18.0—18.4	0.71—0.72	37	18.0—18.4	0.71—0.72	87
18.5—18.9	0.73—0.74	38	18.5—18.9	0.73—0.74	88
19.0—19.4	0.75—0.76	39	19.0—19.4	0.75—0.76	89
19.5—19.9	0.77—0.78	40	19.5—19.9	0.77—0.78	90
20.0—20.4	0.79—0.80	41	20.0—20.4	0.79—0.80	91
20.5—20.9	0.81—0.82	42	20.5—20.9	0.81—0.82	92
21.0—21.4	0.83—0.84	43	21.0—21.4	0.83—0.84	93
21.5—21.9	0.85—0.86	44	21.5—21.9	0.85—0.86	94
22.0—22.4	0.87—0.88	45	22.0—22.4	0.87—0.88	95
22.5—22.9	0.89—0.90	46	22.5—22.9	0.89—0.90	96
23.0—23.4	0.91—0.92	47	23.0—23.4	0.91—0.92	97
23.5—23.9	0.93—0.94	48	23.5—23.9	0.93—0.94	98
24.0—24.4	0.95—0.96	49	The barometric tendency cannot be reported.		99

Code XI.—Sea Surface Temperature.

Sea surface temperature to tenths of a degree Centigrade is coded by three figures, or, when necessary, by two figures preceded by zero. If the temperature is negative, the first of these three figures is 5.

For example : — 2.2° C. is coded as 522.
 + 1.0° C. " 010.
 + 15.6° C. " 156.

the barometer
taken at
3 mm. in
3.6 millim.
from the
to the follow.

TABLE OF CORRECTIONS FOR REDUCING BAROMETRIC HEIGHTS TO 0° C. AND TO SEA LEVEL.

NOTE.—The barometric reading should first be corrected for index error. This error may be neglected if it is less than 0.3 mm. The + sign indicates that the correction is to be added to the barometric ruling. The - sign indicates that the correction is to be subtracted.

Temperature by the thermo- meter attached to the baro- meter		Corrections to be made.																
		- 4° C. 24.8° F.	- 2° C. 28.4° F.	0° C. 32° F.	+ 2° C. 35.6° F.	+ 4° C. 39.2° F.	+ 6° C. 42.8° F.	+ 8° C. 46.4° F.	10° C. 50° F.	12° C. 53.6° F.	14° C. 57.2° F.	16° C. 60.8° F.	18° C. 64.4° F.	20° C. 68° F.	22° C. 71.6° F.	24° C. 75.2° F.	26° C. 78.8° F.	28° C. 82.4° F.
M'tres.	Ft. In.	Height of barometer cistern above sea level.																
		Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
0	0 0	+0.5	+0.3	0.0	-0.2	-0.5	-0.7	-1.0	-1.2	-1.5	-1.7	-2.0	-2.2	-2.5	-2.7	-3.0	-3.2	-3.5
1	3 3	+0.6	0.4	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1	3.4
2	6 7	+0.8	0.5	0.3	0.0	0.3	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8	3.0	3.2
3	9 10	+0.9	0.6	0.4	+0.1	0.4	0.6	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1
4	13 1	+1.0	0.8	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8	3.0
5	16 5	+1.2	0.9	0.7	0.4	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.7	2.9
6	19 8	+1.3	1.0	0.8	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8
7	22 0	+1.4	1.2	0.9	0.6	0.3	+0.1	0.1	0.4	0.6	0.9	1.1	1.4	1.6	1.9	2.2	2.4	2.7
8	26 3	+1.5	1.3	1.0	0.7	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.3	2.6
9	29 6	+1.7	1.4	1.2	0.8	0.6	0.3	+0.1	0.2	0.4	0.6	0.9	1.1	1.4	1.6	2.0	2.2	2.5
10	32 10	+1.8	1.6	1.3	1.0	0.7	0.5	0.2	0.0	0.3	0.5	0.8	1.0	1.3	1.5	1.9	2.1	2.4
11	36 1	+1.9	1.7	1.4	1.1	0.8	0.6	0.3	+0.1	0.2	0.4	0.7	0.9	1.2	1.4	1.8	2.0	2.2
12	39 4	+2.0	1.8	1.5	1.2	1.0	0.7	0.5	0.2	0.0	0.3	0.5	0.8	1.1	1.3	1.6	1.9	2.1
13	42 8	+2.2	1.9	1.7	1.3	1.1	0.8	0.6	0.3	+0.1	0.2	0.4	0.7	0.9	1.2	1.5	1.8	2.0
14	45 11	+2.3	2.0	1.8	1.5	1.2	1.0	0.7	0.4	0.2	0.0	0.3	0.6	0.8	1.1	1.4	1.6	1.9
15	49 3	+2.4	2.2	2.0	1.6	1.4	1.1	0.8	0.6	0.3	+0.1	0.2	0.5	0.7	1.0	1.3	1.5	1.8
16	52 6	+2.5	2.3	2.1	1.7	1.5	1.2	0.9	0.7	0.4	0.2	0.1	0.4	0.6	0.9	1.2	1.4	1.6
17	55 9	+2.6	2.4	2.2	1.9	1.6	1.3	1.1	0.8	0.6	0.3	0.1	0.4	0.6	0.9	1.2	1.4	1.6
18	59 1	+2.8	2.5	2.3	2.0	1.7	1.4	1.2	0.9	0.7	0.4	0.2	0.3	0.5	0.8	1.0	1.3	1.5
19	62 4	+2.9	2.6	2.4	2.1	1.9	1.5	1.3	1.0	0.8	0.6	0.3	0.1	0.4	0.6	0.9	1.2	1.4
20	65 7	+3.0	2.8	2.5	2.3	2.0	1.7	1.4	1.2	0.9	0.7	0.4	0.0	0.3	0.5	0.8	1.0	1.3
21	68 11	+3.1	2.9	2.6	2.4	2.1	1.8	1.5	1.3	1.0	0.8	0.5	+0.1	0.2	0.4	0.7	0.9	1.2
22	72 2	+3.3	3.0	2.8	2.5	2.2	1.9	1.7	1.4	1.2	0.9	0.6	0.2	0.1	0.3	0.6	0.8	1.1
23	75 6	+3.4	3.1	2.9	2.6	2.4	2.1	1.8	1.5	1.3	1.0	0.8	0.4	+0.1	0.2	0.4	0.7	0.9
													0.4	0.2	0.1	0.3	0.6	0.8

**TABLE FOR CONVERTING BAROMETRIC READINGS IN INCHES
INTO MILLIMETRES.**

Inches and Tenths.	Hundredths of an Inch.									
	0	1	2	3	4	5	6	7	8	9
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
27·0	685·8	686·0	686·3	686·6	686·8	687·1	687·3	687·6	687·8	688·1
·1	688·3	688·6	688·8	689·1	689·3	689·6	689·9	690·1	690·4	690·6
·2	690·9	691·1	691·4	691·6	691·9	692·1	692·4	692·7	692·9	693·2
·3	693·4	693·7	693·9	694·2	694·4	694·7	694·9	695·2	695·4	695·7
·4	696·0	696·2	696·5	696·7	697·0	697·2	697·5	697·7	697·9	698·2
·5	698·5	698·7	699·0	699·3	699·5	699·8	700·1	700·3	700·5	700·8
·6	701·0	701·3	701·5	701·8	702·0	702·3	702·6	702·8	703·1	703·3
·7	703·6	703·8	704·1	704·3	704·6	704·8	705·1	705·4	705·6	705·9
·8	706·1	706·4	706·6	706·9	707·1	707·4	707·6	707·9	708·1	708·4
·9	708·7	708·9	709·2	709·4	709·7	709·9	710·2	710·4	710·7	710·9
28·0	711·2	711·4	711·7	712·0	712·2	712·5	712·7	713·0	713·2	713·5
·1	713·7	714·0	714·2	714·5	714·7	715·0	715·3	715·5	715·8	716·0
·2	716·3	716·5	716·8	717·1	717·3	717·5	717·8	718·0	718·3	718·6
·3	718·8	719·1	719·3	719·6	719·8	720·1	720·3	720·6	720·8	721·1
·4	721·4	721·6	721·9	722·1	722·4	722·6	722·9	723·1	723·4	723·6
·5	723·9	724·1	724·4	724·7	724·9	725·2	725·4	725·7	725·9	726·2
·6	726·4	726·7	726·9	727·2	727·4	727·7	728·0	728·2	728·5	728·7
·7	729·0	729·2	729·5	729·7	729·9	730·2	730·5	730·7	731·0	731·3
·8	731·5	731·8	732·0	732·3	732·5	732·8	733·0	733·3	733·5	733·8
·9	734·1	734·3	734·6	734·8	735·1	735·3	735·6	735·8	736·1	736·3
29·0	736·6	736·8	737·1	737·4	737·6	737·9	738·1	738·4	738·6	738·9
·1	739·1	739·4	739·6	739·9	740·1	740·4	740·7	740·9	741·2	741·4
·2	741·7	741·9	742·2	742·4	742·7	742·9	743·2	743·4	743·7	744·0
·3	744·2	744·5	744·7	745·0	745·2	745·5	745·7	745·9	746·2	746·5
·4	746·8	747·0	747·3	747·5	747·7	748·1	748·3	748·5	748·8	749·0
·5	749·3	749·5	749·8	750·1	750·3	750·6	750·8	751·1	751·3	751·6
·6	751·8	752·1	752·3	752·6	752·8	753·1	753·4	753·6	753·9	754·1
·7	754·4	754·6	754·8	755·1	755·4	755·6	755·9	756·1	756·4	756·7
·8	756·9	757·2	757·4	757·7	757·9	758·2	758·4	758·7	758·9	759·2
·9	759·5	759·7	760·0	760·2	760·5	760·7	761·0	761·2	761·5	761·7
30·0	762·0	762·2	762·5	762·8	763·0	763·3	763·5	763·8	764·0	764·3
·1	764·5	764·8	765·0	765·3	765·5	765·8	766·1	766·3	766·6	766·8
·2	767·1	767·3	767·6	767·8	768·1	768·3	768·6	768·8	769·1	769·4
·3	769·6	769·9	770·1	770·4	770·6	770·9	771·1	771·4	771·6	771·9
·4	772·2	772·4	772·7	772·9	773·2	773·4	773·7	773·9	774·2	774·4
·5	774·7	774·9	775·2	775·5	775·7	776·0	776·2	776·5	776·7	777·0
·6	777·2	777·5	777·7	778·0	778·2	778·5	778·8	779·0	779·3	779·5
·7	779·8	780·0	780·3	780·5	780·8	781·0	781·3	781·5	781·8	782·1
·8	782·3	782·6	782·8	783·1	783·3	783·6	783·8	784·1	784·3	784·6
·9	784·9	785·1	785·4	785·6	785·9	786·2	786·4	786·7	786·9	787·1
31·0	787·4	787·6	787·9	788·2	788·4	788·7	788·9	789·2	789·4	789·7
·1	789·9	790·2	790·4	790·7	790·9	791·2	791·5	791·7	792·0	792·2
·2	792·5	792·7	793·0	793·2	793·5	793·7	794·0	794·2	794·5	794·8
·3	795·1	795·3	795·5	795·8	796·0	796·3	796·5	796·8	797·0	797·3
·4	797·6	797·8	798·1	798·3	798·6	798·8	799·1	799·3	799·6	799·9

Table for converting Minutes to tenths of a Degree.

Minutes.					Minutes.				
Tenths of a degree.					Tenths of a degree.				
0-3	..	..	..	0	34-39	..	..	..	6
4-9	..	..	..	1	40-45	..	..	..	7
10-15	..	..	..	2	46-51	..	..	..	8
16-21	..	..	..	3	52-57	..	..	..	9
22-27	..	..	..	4	58-59	..	..	..	10
28-33	..	..	..	5					

EXAMPLE.

Message containing Meteorological Information.

Ice :

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Time of observation	1 p.m.—4 p.m.	5	4 a.m.—7 a.m.	2
Nature of ice or derelict	Single iceberg	1	Field ice	5
Position of ice or derelict .. {	Latitude 44° 35'	446	Latitude 42° 58'	430
	Longitude 43° 15'	433	Longitude 47° 3'	470

Weather :

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Position of ship	Latitude 45° 13'	825	Latitude 43° 47'	863
Direction and force of wind.. {	Longitude 42° 5'		Longitude 46° 33'	
	E.S.E. 5	26	S.W. 2	55
Set and velocity of current ..	N.W. 2 m-h	82	S.S.E. 1 m-h.	39
Weather	Sky clear	0	Fog	8
Barometer	765.3 mm.	653	753.2 mm.	532
Air temperature	15.3° C.	61	9.8° C.	50
Barometric tendency	Rise .8	02	Fall 2.7	56
Sea-surface temperature	1.4° C.	014	— .7° C.	507

The Code of the above message sent to the Meteorological Office would thus be :

Meteorology : Ice 21514, 46432 : 22254, 30470 : Weather 21825, 26820 65361, 02014 : 22863, 55398, 53250, 56507.

ARTICLE II.

SAFETY SIGNAL.

The radiotelegraph stations which have to transmit to ships information involving safety of navigation and being of an urgent character (icebergs, derelicts, cyclones, typhoons, sudden changes in the position or form of fixed obstructions or of land marks) shall make use of the following signal, called the safety signal, repeated at short intervals ten times at full power :

— — — (T T T)

In principle, all radiotelegraph stations receiving the safety signal shall, if the transmission of messages by them would interfere with the receipt by any other station of the safety signal and the following safety message, keep silence, in order to allow all interested stations to receive that message. This does not apply to cases of distress.

The safety message shall be transmitted one minute after the safety signal has been sent out, and shall be repeated thereafter three times at intervals of ten minutes.

The Governments of the Contracting States will select the stations which are to send out to mariners safety information of an urgent character.

When the information in question has been sent out by stations performing the time service, it shall be again sent out after the transmission of the time signal and the weather report.

ARTICLE III. MORSE CODE.

INTERNATIONAL SIGNALS.

These signals may be made at night or in thick weather, either by long and short flashes of light, or by long and short sound signals (whistles, fog-horns, etc.), or during the day by hand flags.

1.—URGENT AND IMPORTANT SIGNALS.

You are standing into danger.. ..	• • —
I want assistance: remain by me	• • • —
Have encountered ice	• — —
Your lights are out (<i>or</i> , burning badly) ..	• — — •
The way is off my ship; you may feel your way past me	• — •
Stop (<i>or</i> , heave to); I have something important to communicate	• — • •
Am disabled; communicate with me ..	• • — •

2.—GENERAL SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.	How Answered.
Preparative ..	• • • • • &c.	A succession of E's in one group	By the general answer T.
Answer	—	T (singly)	
Spelling	• • — • • — •	F F in one group	By the general answer T.
Use International Code of Signals	— — — — —	M M M in one group	By the general answer T.
International Code Flag sign	— — — — —	M M in one group	
Break sign	• • • •	I I as separate letters	
Stop	• • • • •	I I I as separate letters	
Finish of the message	• • • — •	V E as one group	• — • R. • • • D. As separate letters.
Erase sign	• • • • &c.	A succession of E's as separate letters	By a succession of E's as separate letters.
Annul	W — — — — W	W W as one group	By W W as one group.
Repeat word after: (when a single word is required)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I • — — • W A • — — • </div> <div> Followed by the word preceding the one required </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I as one group W A as separate letters </div> <div> } </div> </div>	By the general answer T.
Repeat all after: (if more than one word is required)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I • — — • A A • — — • </div> <div> } </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I as one group A A as separate letters </div> <div> } </div> </div>	By the general answer T.
Repeat all: (if the whole message is to be repeated)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I • • — — • A L L • — — • </div> <div> } </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> I M I as one group A L L as separate letters </div> <div> } </div> </div>	By the general answer T.

3.—NATIONALITY SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.
American	— — — — —	C D as separate letters.
Argentine	— — — — —	C G " "
Austro-Hungarian	— — — — —	C F " "
Belgian	— — — — —	D C " "
Brazilian	— — — — —	D E " "
British	— — — — —	F.
Bulgarian	— — — — —	D F as separate letters.
Chilian	— — — — —	D G " "
Chinese	— — — — —	E C " "
Colombian	— — — — —	E D " "
Danish	— — — — —	E F " "
Dutch	— — — — —	E G " "
French	— — — — —	F.
German	— — — — —	G.
Greek	— — — — —	M M in one group followed by D.
Italian	— — — — —	C E as separate letters.
Japanese	— — — — —	C.
Mexican	— — — — —	F C as separate letters.
Norwegian	— — — — —	M M in one group followed by C.
Peruvian	— — — — —	F D as separate letters.
Portuguese	— — — — —	F E " "
Russian	— — — — —	D.
Siamese	— — — — —	F G as separate letters.
Spanish	— — — — —	G C
Swedish	— — — — —	M M in " " followed by E.
Turkish	— — — — —	G D as separate letters.
Uruguayan	— — — — —	G E " "
Venezuelan	— — — — —	G F " "

4.—INSTRUCTIONS.

1. THE URGENT AND IMPORTANT SIGNALS may be made without the Preparative Signal being answered if it is supposed that the person addressed cannot reply, or in other special circumstances; but in this case a pause should be made between the Preparative Signal and the message.

2. THE SIGNAL • • — • • • — • (FF) is used previous to any letters which are intended to spell words.

3. THE SIGNAL — — — — — (MMM) is used previous to any message sent by means of the International Code of Signals.

4. THE SIGNAL — — — — — (M.M) means the Code Flag of the International Code of Signals, and is used as indicated in the Code Book.

5. THE BREAK SIGN is used between the address of the receiver and the text of the message, and after the message if the name of the sender is to be signalled.

6. THE STOP is used, where necessary, in the text of the signal.

7. THE ERASE is used to cancel the last word or signal group, sent by mistake.

8. THE ANNUL is used to cancel *all* the message.

9. METHOD OF ANSWERING. Each word or signal group, when understood, is to be answered by one long flash — (T).

If a word or signal group is not answered, the sender is to repeat it until answered by a long flash.

At the end of the message, if understood, the receiver will make • — • • • (RD).

The Erase and Annul signs are to be answered by their own signs.

10. THE NATIONALITY SIGNAL is made immediately after the answer to the Preparatory Signal has been received, to indicate the nationality of the vessel making the signal. It is answered by the nationality signal of the vessel receiving the message.

SAFETY CERTIFICATE.

Radiotelegraph installation :—

—	Class and numbers required by Articles 33 and 34 of the said Convention.	Actual class and numbers.
Class of Ship :—	—	—
Number of { Operators of the 1st Class ..	—	—
{ 2nd " ..	—	—
{ "Certificated Watchers " ..	—	—

III. That in all other respects the ship complies with the requirements of the said Convention so far as those requirements apply thereto.

This certificate is issued under the authority of the Government. It will remain in force until

The undersigned declares that he is duly authorised by the said Government to issue this certificate.

(Signature)

Issued at

the

day of

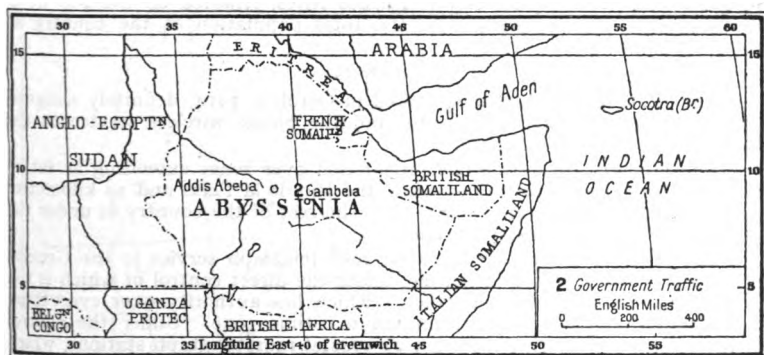
WIRELESS LAWS AND REGULATIONS

THE VARIOUS ACTS, DECREES, REGULATIONS, ETC., REFERRED TO IN THE FOLLOWING LAWS ARE ENUMERATED AT THE BEGINNING OF EACH COUNTRY'S LAWS AND DISTINGUISHED BY CAPITAL LETTERS OF THE ALPHABET.

(N.B.—The wireless information in the maps in this book is copyright by the Wireless Press, Ltd., 12-13, Henrietta Street, Strand, London, W.C.2.)

ABYSSINIA

THIS historically famous country, more commonly known to the ancients as Ethiopia, is an empire, at present under the rule of Waizeru Zauditu. The people profess a primitive form of Christianity, but are illiterate, and the admission of Abyssinia to the Postal Union is probably due to the fact that the posts and telegraphs are under French administration.



There are no wireless stations working in the "Empire" under independent native rule, but a radiotelegraphic station is maintained at Gambela, in the enclave of Kassala. This was constructed, and is worked, by the Sudan Government. (For Regulations, see under "Sudan.")

ADEN

(See BRITISH SOMALILAND.)

ADMIRALTY ISLAND

(MANUS)

(See map on page 139.)

ALASKA

(See UNITED STATES OF AMERICA.)

ALGERIA

(See FRANCE.)

ANGOLA

(See PORTUGUESE WEST AFRICA.)

ANNAM

(See FRANCE.)

ANTIGUA

(See LEEWARD ISLANDS.)

ARGENTINA

SITUATED, so far as latitude is concerned, between 20° 50' and 55° 19' South, and possessing a longitude stretching from 53° 41' to 70° 56' west of Greenwich, Argentina is the second in size of the republics of South America. The country was first visited by Spanish explorers in 1516, and remained a colony of Spain until 1810, when the natives commenced their struggle for independence, which was solemnly proclaimed by the Congress assembled at Tucuman in 1816.

This was followed by a long period of civil war until 1853, when a National Constitution was elaborated, with modifications introduced in 1860, 1866, and 1898. Great Britain definitely recognised Argentine independence in 1825. The system of government adopted is that of a Federal Republic composed of three powers—the Executive, the Legislative, and the Judicial. The Executive power is exercised by the President of the Republic, who remains in office for a period of six years, assisted by eight Minister-Secretaries. The Legislative power is exercised by a National Congress composed of two Chambers, the Senate and the Chamber of Deputies.

The total area of the fourteen autonomous provinces and ten national governments which go to make up Argentina comprises in all about 1,132,000 square miles. The capital city is Buenos Aires, situated on the Rio de la Plata. The census of 1914 gave the total population of the country as comprising 7,905,502 persons.

CONTROL.

The Radiotelegraphic Law, passed in October, 1914, definitely assigned the direction of wireless telegraphy and the public wireless service to the Ministries of War and Marine.

The Ministry of Marine has jurisdiction over zones extending as far as 100 kilometres from the sea coast and the Rio de la Plata and 50 kilometres on each bank of the navigable rivers. The rest of the country is under the jurisdiction of the Ministry of War.

The chief of the public maritime radiotelegraph service is the General Secretary of the Ministry of Marine, under the direct control of which is the "División Servicio Radiotelegrafico," which has authority over everything concerning radiotelegraphy within the maritime zone. Under the control of the Ministry of Marine there are 21 coastal radiotelegraph stations, which are of the Telefunken system modified in accordance with the necessities of the Navy. According to the latest information, they are:—

Commercial traffic with ships	11
Naval official traffic only	6
Public correspondence in the inland service ..	2
Official correspondence inland	2

There are also 78 ship stations.

The "División Servicio Radiotelegrafico" has its own radiotelegraph works which construct and repair the greater part of the apparatus used in the Navy. These works are also able to effect repairs to radiotelegraph apparatus of merchant vessels calling at Argentine ports.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Sr. D. Julio Moreno ..	Minister of Marine	Buenos Aires
Capt. de Navio, Ismael F. Galindez	Secretary-General of the Ministry and Chief of the Public Maritime Radiotelegraphic Service	Buenos Aires
Capt. de Fragata, Francisco Arnaut	Chief of the Divisional Radiotelegraphic Service	Buenos Aires



The Supreme Government has granted four concessions to different foreign countries to instal and work within the maritime zone high-power radiotelegraph stations. These companies are: the "Compañía Marconi de Telegrafía sin Hilos de la Plata" (English), which will place this country in communication with England, the "Pan American Wireless Telegraph and Telephone Company" (North American), which has taken over the concession granted to the "Federal Holding Company" to communicate direct with the United States, the German "Wireless Telegraph Company of Berlin" represented by the Siemens Schukert Company, which holds the concession to communicate direct with Nauen. Lastly, there is the Spanish Company "Gasoliba Alvargonzalez Sociedad Anonima" of Radiotelegraphy and Radiotelephony, which will place Buenos Aires in communication with the Iberian Peninsula.

There are also some private stations of very small energy, the installations of which are used solely for experimental purposes.

ORGANISATION.

The Station of Dársena Norte (LIA) transmits daily to all ships and coast stations a news service, as does likewise the radiotelegraph "top" which gives the official time.

There are no special publications devoted to wireless.

ADMINISTRATION.

Below are given the law and regulations in force at the present time:—

A—Law No. 9,127 regarding radiotelegraphy.

B—Regulations made by the Executive Power for Radiotelegraphy.

C—Decrees of the Executive Power amplifying the regulations.

LAW.

A LAW NO. 9,127 PASSED BY THE NATIONAL CONGRESS ON SEPTEMBER 16TH, 1913.

ART. 1.—The wireless service within the national territory, and for international communications within a minimum distance of 1,000 kilometres, shall be exclusively under the control of the State.

ART. 2.—The executive shall attend to the erection of wireless stations within the national territory, and shall so select the sites for the coast ones that all ships sailing near our coasts and navigating our rivers may always be in touch with them.

ART. 3.—The sum of \$100,000 national currency are hereby allocated to the above. This amount will be charged to General Expenses.

ART. 4.—The use of wireless apparatus in perfect working order is hereby declared compulsory for all ships calling at the ports of Argentina carrying fifty or more persons on board, counting the passengers and the crew, on and after ninety days have elapsed since the promulgation of this law.

ART. 5.—Wireless apparatus handled by skilled operators must have at all times a transmission power of not less than 200 kilometres for river craft, and not less than 500 kilometres for sea-going vessels.

ART. 6.—No ships will be allowed to leave port until the prescriptions of Arts. 4 and 5 have been complied with, and should the captain or the officer in charge try to elude or contravene this regulation, the superior local marine authority shall impose a fine of from 1,000 to 5,000 pesos. The party so fined can appeal to the federal magistrate of the district where the contravention has been committed. A double fine will be the penalty for a repetition of the offence.

ART. 7.—The Executive will promulgate the regulations in accordance with this law.

ART. 8.—The above Act of Parliament shall be communicated to the Executive.

The above was approved by the Argentine Congress in the city of Buenos Aires on the sixteenth day of September in the year of our Lord nineteen hundred and thirteen.

EXECUTIVE DECREE OF JULY 12TH, 1917.

This is divided into two parts. Of these Part I only is printed.

PART I.

CHAPTER I.

SUB-SECTION I.

B ART. 1.—The "General Rules and Regulations for the Radiotelegraphic Service in the Argentine Republic," as issued by the Secretary-General of the Marine Ministry are hereby approved.

ART. 2.—The following Regulations and Ordinances are hereby repealed:

Regulations for the Radiotelegraphic Stations of the Navy (December 1st 1906).

Regulations and Plan of Studies for the Radiotelegraphic Staff (November 27th, 1912).

Regulations for the Radiotelegraphic Service (July 5th, 1913).

Regulations for the Radiotelegraphic Service in the Argentine Republic (October 24th, 1914), and every other regulation affecting the Radiotelegraphic Service issued either as General Instructions, Orders of the Day or Circular Letters from the Marine Ministry, as from the year 1906 inclusive to this date.

ART. 3.—The necessary copies of the new Rules, as mentioned in Art. 1) to be printed.

ART. 4.—This decree to be communicated, published, etc.

(Signed) Irigoyen.

F. ALVAREZ DE TOLEDO.

The following are the documents approved by the Executive Decree above quoted:—

SUB-SECTION 2.

ORGANISATION OF THE RADIOTELEGRAPHIC DEPARTMENT.

ART. 1.—The Radiotelegraphic Service constitutes a Department of the General Secretaryship of the Ministry of Marine.

ART. 2.—The following duties correspond to this Department:—

(a) To intervene in everything affecting the military and public radiotelegraphic service depending from the Ministry of Marine and under its inspection and control.

(b) To intervene in the formation of reports and in the claims and suits that may be promoted.

(c) To study and comply with the international laws, regulations, instructions and conventions or pacts that may affect this service.

(d) To work in the reforms tending to improve the service both in connection with technical details and those of a purely disciplinary character.

(e) To intervene in the preparation of instruction plans and the examination of subordinate radiotelegraphists and civil operators, to propose their promotion and to issue the corresponding credentials (*patentes*).

(f) To intervene in the purchase of radiotelegraphic materials, giving advice and reporting on results.

(g) To attend to that part of the correspondence and intercourse with the Berne International Office referring to this service.

ART. 3.—The Radiotelegraphic Service Department will be divided into the following sections:—

(a) Inquiries, Correspondence, and Archives.

(b) Technical Inspection and Superintendency.

(c) Shop, Installations, and Repairs.

(d) Test of apparatus and materials.

(e) Accounting.

ART. 4.—The staffs in the land stations and in the floating lighthouses will be as permanent as consistent with the good service. The staffs will in matters affecting discipline, re-examination and licences, be subordinate to the Secretary of the Ministry: but the last-named officer will see that the General Direction of Personnel is kept informed of the changes occurring in this service.

With the General Secretary rests the duty of putting before the General Director of Personnel any changes that may be considered necessary in the radiotelegraphic staffs on board units of the Navy.

CHAPTER II.

REGULATIONS GOVERNING THE RADIOTELEGRAPHIC SERVICE.

SUB-SECTION I.

JURISDICTION OF THE SEVERAL MINISTRIES ACCORDING TO LAW No. 9127.

ART. 1.—The national territory is hereby divided into two zones for the purposes of jurisdiction and regularisation affecting the

service of radiotelegraphic installations. The aforesaid zones are as follows:—

(a) The *Maritime Zone*, which includes all ship stations in the maritime territorial waters and navigable rivers, besides all land stations situated within one hundred kilometres from the sea and River Plate coasts and those situated within fifty kilometres from the banks of any other navigable rivers.

(b) The *Terrestrial Zone*, which includes all other installations on national territory which are not covered by the above.

ART. 2.—(a) The Maritime Zone is under the jurisdiction of the Minister of Marine, who is responsible for the control of the Public Radiotelegraphic Service and who prescribes the rules and regulations for wireless service in this particular zone.

(b) The Minister of Marine shall also undertake the duty of transmitting all information of any nature which may be asked from him by the International Bureau of Berne.

ART. 3.—(a) The Terrestrial Zone is under the jurisdiction of the Minister of the Interior, who controls the Public Radiotelegraphic Service and who prescribes the rules and regulations for wireless in this particular zone.

(b) In special cases when a state of siege is declared, all installations in this zone shall be placed under the control of the War Office.

ART. 4.—Other Executive Offices can order the installation of wireless stations for their exclusive use, but in such cases the working of such installations must be authorised by the Minister exercising control in the respective zones, and the rules and regulations prescribed for the latter must be observed in these particular stations.

ART. 5.—All wireless installations erected in the national territory must observe the international rules and regulations adhered to by the Government of the Republic, and the General Law regulating the Telegraphic Service must be observed in all matters appertaining to the Public Radiotelegraphic Service.

SUB-SECTION 2.

PERMITS FOR THE INSTALLATION OF PRIVATELY OWNED RADIOTELEGRAPHIC STATIONS.

ART. 1.—Law 9127 having been passed with the object of nationalising of the wireless service, the installation of high-powered wireless stations by private individuals or corporations shall only be allowed in the national territory when such installations are destined for inter-continental communication.

ART. 2.—The granting of such concessions as authorised by Art. 1 corresponds to the Minister in whose jurisdiction the new station is to be erected.

ART. 3.—Where the Minister having control over the zone where the wireless installation is to be erected has given his consent, all the rulings of said Ministry, or any other of its decisions regarding the stations directly dependent on the said installation, must be obeyed unquestionably.

ART. 4.—In general it shall be the duty of the Minister of the Interior to negotiate the bases of agreements in course of conclusion with neighbouring countries, and he will communicate with the Minister of Marine the results arrived at in the course of such negotiations, so that the latter may give effect to any such conventions in so far as they

affect his department. The Minister of Marine shall have the right of being consulted in the negotiation of the bases for such conventions.

ART. 5.—No radiotelegraphic (transmitting or receiving) station will be erected without obtaining first the necessary licence from the Minister in whose jurisdictional zone the station is to be established.

ART. 6.—To obtain the licence referred to in Art. 5, the installation must fulfil the following requirements:—

(1) The primary transmitting power must not exceed 50 watts.

(2) The wavelength must not exceed 300 metres in the transmitter.

(3) The receiver may be suitable to receive waves of any length, providing that the Executive Government have no objection thereto.

(4) The installation must not be used for any interchange of messages in the public service. It will be devoted to experimenting, and only when in the judgment of the Government no harm or disturbance would arise from its use to the nearest national stations can the installation send or receive special messages.

ART. 7.—Anyone infringing the rules set out in Arts. 5 and 6 will be penalised in accordance with the penalties established in the General Law relating to the National Telegraph Service.

ART. 8.—Private installations authorised in accordance with Art. 6 must be inspected by the official inspectors, who are entitled to all the information and data they may demand. These installations must be registered and the wireless apparatus must be stamped by an inspector. The Minister exercising jurisdiction in the respective zone can order at any time the closing of authorised private wireless installations.

SUB-SECTION 3.

REGULATIONS AFFECTING ALL INSTALLATIONS ON NATIONAL TERRITORY AND ON BOARD SHIPS.

ART. 1.—The power to be used in all installations on land will be limited to that necessary for communication with the nearest stations in the system. Coast installations which must have high power in order to communicate at long distances are excluded from this limitation.

ART. 2.—(a) All installations open to public service must receive all messages sent by stations under the control of any Ministry or by any of the National Telegraph offices, provided that the regulations established by each administration regarding the radiograms which may go over their lines are complied with at the original stations from which the messages are radiated.

(b) Foreign vessels under the flag of a country which has not adhered to the London Convention will be allowed to communicate with Argentine coast and stationary ship stations, provided the agents representing the Company owning such foreign ships ask for the extension of this privilege and fulfil all the requirements established by the present Regulations and by the London Radiotelegraphic Convention.

ART. 3.—Radiograms will be transmitted in the order of priority established by the Law on National Telegraphs and the Radiotelegraphic Convention, namely:—

(a) Distress calls have absolute priority

upon any other communication; then follow:—

(b) Service notices of whatever origin when referring to "the Safety of Life at Sea" or containing information of an urgent character for navigation.

(c) Messages from the Executive Government.

(d) Service notices from the Radiotelegraphic stations.

(e) Messages from the Ministry of Marine, its dependencies and its fleets.

(f) Service notices from the shipping companies.

(g) Private messages.

ART. 4.—In accordance with Art. 101 of the Law on National Telegraphs, messages belonging to the same category will be transmitted by the station of origin in the order in which they are delivered to this station, and by the relay stations, in the order in which they are received.

ART. 5.—In accordance with Art. 102 of the Law on National Telegraphs, private messages stamped as urgent in the "telegraph" system, should have priority in transmission, even upon messages of a superior category not stamped as urgent.

ART. 6.—Any radiogram referring to the internal service of a fleet, squadron or division in march, will be considered as urgent and transmitted accordingly.

ART. 7.—Every official unprepaid radiogram or telegram sent by Marine officers with authority to do it, will be signed with the corresponding telegraphic address, and such messages will be legalised outside their text with the seal and signature of the competent officer on land or on board.

ART. 8.—The following is a list of Marine Officers who are authorised to send unprepaid radiograms and telegrams, according to the Navy Disciplinary Regulations:—

Secretary-General of the Ministry.

Chief of the Radiotelegraphic Department.

Chief of the Hydrography, Lighthouses and Buoys Department.

Inspector of the Marine Ministry's Dependencies in Tierra del Fuego and Cabo Virgenes.

Director-General of Personnel.

Director-General of Material.

Director-General of Administration.

Prefect-General of Ports.

Prefects of Maritime and River Zones.

Director of the Naval School.

Director of the Training School.

Director of the Mechanics School.

Chiefs of Fleets, Divisions, Squadrons, Light Squadrons or Groups.

Chiefs of Staff of Squadrons and Divisions.

Chiefs of Shipyards and Maritime Zones.

Chief of the Aviation Grounds in "Fuente Barragán."

Commanders of Ships.

Commander of the Marine Depot (*Depósito de Marina*).

Command of Coast Artillery and "Martín García."

Managers of Coast Radiotelegraphic Stations.

Managers of Lighthouses and Director of the "Año Nuevo" Observatory, when addressing the Chief of Hydrography, Lighthouses and Buoys, or the sectional chiefs in his jurisdiction.

Sub-Prefects and their Assistants when

addressing the Prefect-General or the jurisdictional Prefect.

The lists of officers belonging to other branches of national service and who have authority to forward unrepaid messages will be communicated to the Radiotelegraphic Offices when necessary.

ART. 9.—The Manager of a station may demand from any sender of a radiogram proof of his identity before transmitting the message, acting in accordance with Arts. 82 and 83 of the Law on National Telegraphs of 1875.

ART. 10.—In order to improve the service and with a view to regulate the exchange of radiograms between units of the Navy, coast stations, and foreign ships—strictly following the regulations established by the London International Radiotelegraphic Convention of 1912—the Radiotelegraphic Stations belonging to the Navy—whether opened or not to the public—will act in the way hereinafter detailed to make their calls, answers, transmissions, requests of rectification, repeats and notices of reception—viz.:—

1. Calls.

Every call is made up by the sign —●—●—●— followed by the letters of the station to be called, repeated three times, and by the word "de" (—●—●—●—), followed by the call letters of the calling station repeated three times.

Example of a Call.—Station LIA calls station LIC thus: —●—●—●— LIC LIC LIC —●—●—●— LIA LIA LIA.

2. Answers.

The station that is being called answers thus: The sign —●—●—●— followed by the call letters of the calling station, repeated three times; then the word "de" followed once by the call letters of the called or answering station, and ending with the sign —●—●—●— (invitation to transmit).

Example of an Answer.—Station LIC answers its call to station LIA inviting the latter to transmit its communication, thus: —●—●—●— LIA LIA LIA —●—●—●— LIC —●—●—●—

3. How to Transmit a Radiogram.

The following are the elements in which is divided every radiogram:

1. Sign of attention —●—●—●—
 2. Preamble.
 3. Supplementary Service instructions, if any.
 4. Address.
 5. Text of the radiogram.
 6. Signature.
 7. Signal of end of message —●—●—●—
 8. Call letters of the transmitting station.
- If there are several radiograms to transmit these letters will be sent only after the last message.

The Preamble of a radiogram is composed as follows:—

- I. The word "Radio."
- II. Class of the radiogram.
- III. Category of the radiogram. (Class and category are expressed by a group of letters called *prefix*.)
- IV. Name of the office of origin.
- V. Number of the radiogram.
- VI. Number of words.
- VII. Date and hour in which the radiogram was received for transmission.
- VIII. Service instructions.
- IX. Sign —●—●—●— (Double hyphen).

Supplementary service instructions are those which are transmitted upon request from the sender, and are charged for.

The following order will be observed in the transmission of every radiogram:

Preamble:

1. Sign of attention —●—●—●—
2. The word "Radio."
3. Class of the radiogram.
4. Category of the radiogram.
5. Name of office of origin.
6. Number of the radiogram
7. Number of words.
8. Date and hour in which the radiogram was received for transmission.
9. Service instructions.
10. The sign —●—●—●—

Supplementary Service Instructions:

11. Supplementary service instructions (if any).
12. The sign —●—●—●—

Address:

13. The address (which will have at least two words).
14. The sign —●—●—●—

Text:

15. The text of the radiogram.
16. The sign —●—●—●—

Signature:

17. Signature.
18. Signal of end of message —●—●—●—
19. Call letters of the transmitting station.

Examples.—1. At 8.15 a.m. of the 15th of a month was delivered at the TORO station a radiogram for transmission, as follows: Lopez Sarmiento 667 Buenosaires. Send by fast freight 10 cases Viscosine oil. Suárez.

The above radiogram will be transmitted in the following order: —●—●—●— Radio (prefix of class and category) TORO. 175 13 15 8.15 m. —●—●—●— López Sarmiento 667. Buenosaires —●—●—●— Send by fast freight 10 cases Viscosine oil —●—●—●— Suárez —●—●—●— LMP.

2. The Radiotelegraphic installation of "Dársena Norte" receives the following message on the 25th at 8.15 p.m. from Morón for Benítez, steamship Rawson: On arrival you will find letter and documents asked for. Rodríguez." This radiogram will be transmitted thus: —●—●—●— Radio (prefix) Morón 16 14 25 8.15p. —●—●—●— Benítez Steamship Rawson —●—●—●— On arrival you will find letter and documents asked for —●—●—●— Rodríguez —●—●—●— LIA.

3. Example of a radiogram from the ship Cabo Corrientes, on the 15th at 3 p.m., to be transmitted to Berlin, via Monrovia, and reading: Schroeder Uhlundstrasse 35 Berlin. Send motor type DRS 10 HP. Wagner. This message will be transmitted thus: —●—●—●— Radio (prefix) Cabo Corrientes 25 11 15 3 s via Monrovia —●—●—●— Schroeder Uhlundstrasse 35 Berlin —●—●—●— Send motor type DRS 10 HP. —●—●—●— Wagner —●—●—●— LMO.

4. Notice of Reception.

When the receiving station receives a radiogram and has verified the number of words stated in the preamble, notice of reception must be given in this form:

"Call letters of the transmitting station followed by the word *de* (from) followed by its own call letters. Then the letter R, the number of the radiogram and the sign to indicate end of transmission —●—●—●— or end of work —●—●—●—, as the case may be.

Example: —●—●—●— LIA de LMX R 76 —●—●—●—

5. How to ask for a "Repeat."

The method to ask for a repeat will be the following:—

"The characteristics of the transmitting station will be sent followed by the word *de* (from), and then by the characteristics of the receiving station, and the combination QTA followed by the number of the radio."

Example: —●●●●● LIA de LMX QTA 77 —●●●●●

If only a part of the radiogram is to be repeated, the message will be: —●●●●● LIA de LMX QTA 78 desde (from) —●●●●●

Should the receiving station have any doubt as to the radiogram received or the number of its words, a rectification may be requested thus:—

"Sign of attention —●●●●●; call letters of the transmitting station, once; the word *de* (from): call letters of the receiving station; the combination QTC: the number of the radiogram to be rectified and the signal —●●●●●

Example: LMX asks from LIA the rectification of radiogram 71: —●●●●● LIA —●●●●● LMX QTC 71 —●●●●●

Station LIA answers: —●●●●● LMX —●●●●● LIA QTC 71 r z p z v w k r —●●●●● Here the letters and figures r, z, p, z, v, w, k, r are the initial letters of each word and the first figures of each number.

6. How to Express the Number of Words.

When the actual number of words signalled is not the same as the number of words charged for, the fact should be expressed as a common fraction in which the numerator will indicate the number of words charged for and the denominator the actual number of words transmitted.

Take as an example the following radiogram: Alvarez Calle Corrientes 725 Buenosaires. Ship immediately: 100 litres benzine, 5 kilograms oakum, 5 kilograms Viscosine oil Suárez 22/18 (22 —●●●●● 18).

The real number of words in the message is 18, but the three punctuation marks and the underline are counted and charged as words.

7. How to give the Date and Hour.

The date and the hour will be indicated by two groups of figures: the first group will represent the date of the month, and the second the hour and minutes followed by the letter *m* or the letter *s*, as the case may be, meaning *before noon* and *after noon*, respectively.

For instance, in a message received for transmission the 15th of the current month at 4.36 p.m., this information will be given thus: 15 4.36 s.

8. How to Use the Sign —●●●●●

Hereafter the sign —●●●●● will be used to represent the double dash (=), and not as heretofore to represent the letter *elle* (ll). This letter ll will be represented from now on by two consecutive *elles* (ll) (—●●●●● —●●●●●).

9. How to Request a Station to Wait.

When a coast station is not ready to receive a number of radiograms after the preliminary communications from a ship, as detailed in Art. XVIII of the Rules annexed to the London Radiotelegraphic Convention of 1912, the land station will have to instruct the ship to wait, and such instructions will be communicated in the following manner:

—●●●●● LMO —●●●●● LIA —●●●●● —●●●●● 50 —●●●●● 10 —●●●●●

This means that the station LIA acknowledges receipt of communication from station LMO, and using the service TR notation informs LMO that it has 50 words to communicate, and begs the ship station to wait ten minutes. In these communications the figures will be transmitted using the abridged notation.

10. Use of TR Notation.

Service communications will be preceded by the TR notation.

ART. 11.*—When the text of a radiogram is totally or partially in plain language, the following information will be given in the radiogram:—

1. Total number of compound words as a basis for the charge.
2. Number of plain words in plain language or with a conventional meaning.
3. Number of groups of figures or letters, expressed thus:

20/12/6.

This rule applies specially:—

(a) When a radiogram in plain language contains words of more than 15 letters (international system of counting words) or more than 7 syllables (according to our national rule).

(b) When a radiogram in code language contains words with more than 10 letters.

(c) When the radiogram contains groups of figures or letters of more than five characters.

ART. 12.—A radiogram must not contain more than 100 words. If the sender needs more words he must divide his communication in as many messages as necessary to comply with the above rule, and these radiograms will be transmitted alternatively with those from other senders presented for the next turn.

Official unrepaid radiograms must not contain more than 50 words.

ART. 13.—(a) Radiotelegraphic messages transmitted, relayed or received will be kept in the utmost secrecy, as well as the note books, traffic sheets, reports and liquidations of accounts. It is forbidden to divulge the contents of communications intercepted during service hours, even if they do not affect the national public service or the naval service.

(b) If an intercepted radiotelegram contains damaging statements affecting national interests in land or at sea, the information must be communicated at once to the superior of the operator picking up the message, and this operator must keep a memorandum of the text and address of the radiogram concerned.

ART. 14.—It is the duty of every radiotelegraphist to communicate without delay to his superior the contents of intercepted radiograms containing excitations to revolt or affecting the safety of the nation. This information must be transmitted by the superior officer to a competent authority.

ART. 15.—Radiotelegraphic communications, like ordinary telegrams, are confidential: therefore, persons not belonging to the staffs shall not be admitted into the stations.

ART. 16.—In cases referring to the Radiotelegraphic service, not covered by these regulations, the international radiotelegraphic

* This article and the article following would appear to be intended to apply rather to purely Argentine working, as they seem inconsistent with the provisions of the International Telegraph and Radiotelegraph regulations.

conventions and the Law on National Telegraphs will apply. But if a rule or regulation is not found, the case must be submitted in consultation to the nearest (superior) office or to the Radiotelegraphic Department.

To ensure a good service, it is the duty of coast stations to give to ship stations all the information they may require.

ART. 17.—Radiograms will be delivered following the rules contained in Art. 32 of the Law on National Telegraphs.

SUB-SECTION 4.

CHIEF OF THE PUBLIC MARITIME RADIO-TELEGRAPHIC SERVICE.

ART. 1.—The Secretary-General of the Ministry of Marine shall have under his control the Public Radiotelegraphic Maritime Service and his duties will be as follows:—

(a) He shall supervise all coast stations and ship stations after installation, both of national and foreign register, calling at national ports, and shall also supervise all coast stations, as prescribed in Article 2 of Law 9127.

(b) He shall control the service of the said stations and will draft the regulations for same, taking care that the rules herein established and the international Conventions accepted by the National Government are duly fulfilled.

(c) He shall see to it that all regulations concerning rates, discounts and reimbursements, as well as any others that may be later on prescribed by the Post and Telegraph Office regarding the requirements of radiograms relayed to the National Telegraph lines are faithfully complied with.

(d) He shall forward to the Office of Posts and Telegraphs all claims made to the Prefect-General of Ports by Steamship Companies, ship captains or passengers referring to rates, discounts and reimbursements.

(e) He shall issue through the Office of the Prefect-General of Ports the permits for the erection of wireless on board those ships which may have obtained leave to do so in accordance with these Regulations.

(f) He shall issue licences to the wireless telegraphists operating at all stations working within the Maritime Zone, so soon as the conditions affecting such licences have been fulfilled in accordance with these Regulations.

(g) He shall cancel such licences and permits granted to stations and operators within the Maritime Zone as it may, for a good reason, be found necessary to withdraw.

(h) He shall enforce, through the Office of the Prefect-General of Ports, the payment of all fines imposed on shipping companies or ships, and shall direct the deposit of the said fines in the National Bank to the order of the Director of Posts and Telegraphs.

(i) He shall have it in his power to authorise the installation of wireless by private individuals or corporations within the Maritime Zone in accordance with Chapter II, Sub-section 1, Art. 5.

ART. 2.—The head of the Public Maritime Radiotelegraphic Service shall act jointly with the Director of Posts and Telegraphs in the following matters:—

(a) In all matters referring to wireless stations installed on the Maritime Zone.

(b) In all matters referring to rates, discounts and reimbursements of the Public

Radiotelegraphic Maritime Service in order to obtain a monthly settlement of accounts by the shipping companies or ship captains with the Office of Posts and Telegraphs in conformity with the schedules prepared by the latter.

(c) In the investigation of any questions that may arise for consultation from the Wireless International Service. In all such cases, the Office of Posts and Telegraphs shall communicate with the foreign administrations and authorities concerned.

ART. 3.—The Director of Posts and Telegraphs shall deal directly with the Secretary-General of the Ministry of Marine in all cases relating to the Maritime Radiotelegraphic Service.

ART. 4.—The necessary instructions to give effect to the provisions of Art. 1, paragraph (c), and all other regulations concerning the internal management of the radiotelegraphic stations in this jurisdiction, will be issued through the Department of Radiotelegraphic Service. These instructions shall be communicated to the stations by means of private circulars.

SUB-SECTION 5.

THE GENERAL OFFICE OF THE PREFECT-GENERAL OF PORTS.

ART. 1.—The duties of the Prefect-General of Ports will be as follows:—

(a) He shall give effect to the provisions made in Articles 4, 5 and 6 of Law 9127 and shall direct the deposit at the Bank of the "Nación Argentina" of the fines imposed for the non-fulfilment of said provisions. The money so deposited must be placed to the order of the Director of Posts and Telegraphs.

(b) He shall receive from shipping companies, captains or passengers all complaints regarding unsatisfactory service in the coast and ship stations, and shall forward them to the head of the Maritime Radiotelegraphic Service.

(c) Should any complaints be made upon the arrival in port of any vessel, the Prefect shall collate the evidence and forward it to the head of the Naval Radiotelegraphic Service, and he shall act in the same manner should the complaints be made in writing.

(d) He shall prevent the departure of any ship which may have failed to make the necessary deposit at the National Bank (to the order of the Director of Posts and Telegraphs) of the fines imposed in accordance with Article 6 of Law 9127.

(e) Both upon the arrival and departure of merchant ships the Prefect shall have the wireless installations inspected in order to ascertain whether they are in perfect working order and whether the power of the apparatus is that fixed by Law 9127.

ART. 2.—The General Office of the Prefect-General of Ports will refer all matters concerning ship stations to the Director of the Public Maritime Radiotelegraphic Service.

ART. 3.—Besides the inspection and control of ship stations in territorial waters and on craft of all register the general office of the Prefect-General of Ports must attend to the following:—

(1) The dismantling of the transmitting apparatus of the wireless installation as soon as the ship has moored or anchored.

This precaution could be dispensed with, with the consent of the Maritime authority, in the ports of the Southern Coast and in

river ports, where no radiotelegraphic land stations are in existence.

(2) He shall ascertain whether the wireless operator or operators have licences corresponding to the installation they are working, in conformity with Article X of the Service Regulations annexed to the London Convention.

(3) In such cases as those covered by Article XII of the Service Regulations above mentioned, the Prefect-General of Ports shall act jointly with the Director-General of Supplies of the Ministry of Marine in order to give effect to the provisions of the said Article.

ART. 4.—First contraventions of the provisions of Art. 5, paragraph 1, will be recorded by the General Office of the Prefect-General of Ports, and each of those following the first will cause a fine of one hundred pesos, national currency.

SUB-SECTION 6.

COAST STATIONS.

Under the Control of the Head of the Public Maritime Radiotelegraph Service and Open to Public Service.

ART. 1.—The internal service of these stations will be subject to the provisions of these Regulations and those that may be brought into force subsequently.

ART. 2.—Coast stations not open to public service may or may not be shown in the Official Nomenclature as deemed expedient by the Ministry of Marine.

ART. 3.—Radiotelegrams must be deposited by the public at telegraph offices, but radiotelegraphic coast stations subject to the Ministry of Marine will receive direct, and within the regulation hours telegrams presented by the public at such stations when there does not exist a telegraph office in the locality or in the event of such telegraph office being without communication with the remainder of the system.

Exception from this provision is made for private radiotelegrams from the personnel of the Navy and addressed to stations of the Ministry of Marine, and such radiotelegrams, whether or not there is a telegraph office at the place of origin, may be despatched on prepayment of the relative tariff from any radiotelegraph coast station under the control of the said Ministry.

The radiotelegrams referred to in the first paragraph shall follow this route, namely:—

(a) Messages originating from a telegraph office shall continue transmission by the telegraph route as far as the place where is situated the radiotelegraph coast station that is to transmit them to a ship or to the coast station which is nearest that of destination.

(b) Messages handed in by the public at coast stations shall be transmitted by wireless route to the nearest telegraph office having expeditious communication, and thence by the telegraph system to the point of destination or to the other coast station that is to transmit them to the ship station.

(c) Radiotelegrams to ship stations that are within the range of the coast stations from which they originate will be interchanged direct.

With regard to radiotelegrams deposited by the public at coast stations, and destined for a place in the interior of the country or abroad, and those messages which, owing to interruption of the telegraph line with the point of destination, are handed in at a telegraph office for transmis-

sion by wireless route, will be accepted only conditionally.

ART. 4.—Coast stations will accept and retransmit traffic handed over to them by the National Telegraphs, when such traffic cannot reach its destination in due course, by reason of interruption or congestion of its lines. Either of these two circumstances will be communicated directly by the Chiefs of the District to the Officers in Charge of the stations, who will also be advised of the extent of the interrupted sector, or in case of congestion, the number of messages to be retransmitted by the wireless route in order to normalise the traffic. In case of lack of communication between the telegraph office and its head office, the Chief of the former will directly request the co-operation of the interchange radiotelegraph station, making known this circumstance.

In case of interruption or congestion of the lines south of Bahía Blanca, messages from and for Punta Arenas will be retransmitted by stations of the radiotelegraph system only in the event of their destination or origin being any of the offices comprised between Bahía Blanca and Ushuaia.

ART. 5.—If, although there exists at the place where the message is handed in a National Telegraph Office, having efficient communication, or when the message could be retransmitted to destination by the telegraph lines, the sender should, nevertheless, prefer the radiotelegraph route, over the greater part of its transmission, the message will be charged double the ordinary tariff collected by the National Telegraphs in respect of inland telegrams, without prejudice to other taxes that may be applied, calculated according to general rules.

ART. 6.—The men of the Navy shall be able to make use of the wireless system over the greater part of the route from any radiotelegraph station under the control of the Minister of Marine on payment of double the ordinary tariff as mentioned in the previous Article.

Crews and passengers of mercantile vessels of Argentine registry will enjoy the same privilege on payment of the double coast tax.

ART. 7.—Coast stations will not accept from the public messages in secret language unless they have been previously visé by the Chief of the Telegraph Office of the place.

ART. 8.—Messages for the "Press, Stock Exchange and Commercial Centres," will not enjoy the half-rate concession that applies to transmission over the national telegraph lines, if the sender should prefer the radiotelegraph route.

ART. 9.—Public messages received by radiotelegraph stations will be delivered, without exception, to the nearest Post Office for distribution.

ART. 10.—The prefix "D P X" will be employed for those public messages whose senders have paid the double tariff or coast charges indicated in Articles 5 and 6. Such messages will have priority of transmission by the wireless route over other public messages.

ART. 11.—The hours which will be in force at coast stations, as regards attention to the public, will be from 8 a.m. to 8 p.m., both in winter and summer.

ART. 12.—For the supervision of the radiotelegraph service and control of the fulfilment of everything specified in the International Radiotelegraph Convention of London, and of the present regulations, on the part of all radiotelegraph stations, whether ship stations or

coast stations in the maritime zone, the under-mentioned are designated as stations of control:

Dársena Norte will control the port of Buenos Aires and the vicinity.

La Paz will control the port of Rosario and the vicinity.

Río Santiago will control the port of La Plata and the vicinity.

Puerto Militar will control its own port and Bahía Blanca and the vicinity.

Cabo Virgenes will control the south coast.

ART. 13.—In the territories of Santa Cruz and Tierra del Fuego the control over the radiotelegraph service will be exercised by an inspector appointed by the Ministry of Marine.

ART. 14.—For the purpose of accounts, the coast station will be considered as the terminal station in respect of radiotelegrams emanating from the national radiotelegraph service for ship stations, and shall be considered as stations of origin for those messages emanating from ships.

ART. 15.—Coast stations shall accept with absolute priority distress messages made by ships and shall transmit them as "Urgent" messages over the land system.

ART. 16.—Coast stations shall not despatch any official radiotelegram by the lines of the National Telegraphs emanating from vessels or departments of the Ministry of Marine which can reach its destination without such requisite.

Exception is made as regards official urgent radios which may be delayed by interruptions in the radiotelegraph transmission due to atmospheric perturbations or other causes. Nevertheless, according as services may allow they will be transmitted by the wireless route.

ART. 17.—When a vessel of the National Navy shall transmit the "Interruption" signal — • • • — • • • — • • • — repeated several times and followed by her call signal, national merchant vessels and coast stations shall suspend all communication immediately, excepting in cases of shipwreck.

This signal of interruption, which is designated as "Naval Service," shall only be used on the order of the commander of the vessel and shall be employed only in urgent cases that do not permit the normal service wait.

ART. 18.—Apart from cases of shipwreck, the station of Dársena Norte has precedence over the others. When that station transmits the interruption signal, all land stations and ships shall suspend their communications to enable the station of Dársena Norte to work without interruption.

ART. 19.—The radiotelegraph coast stations of the State performing the service of the National Telegraphs shall also observe an internal time table between themselves for the interchange of radios of the public service.

ART. 20.—All national ship and land stations shall suspend their communications during the time that the stations designated for the purpose are transmitting the "Top Radiotelegráfico."

ART. 21.—This decree to be communicated, published, etc., etc.

SUB-SECTION 7.

NATIONAL WARSHIP STATIONS.

ART. 1.—Warship and coast stations shall use for official messages the maximum wavelength possible for their aërials, and should they have to transmit messages to Argentine merchantmen or to foreign merchant steamers they must use the wavelengths specified by the London Convention and by these Regulations.

ART. 2.—In order to avoid difficulties in the general radiotelegraphic service arising from the use by and between Navy units employing Wireless, and which work with the normal wavelength (600 metres)—thus producing interruptions that prevent the reception of other radiograms—this method will be followed, namely:—

1. For Wireless communications in general, between Navy units, their station shall employ the following wavelengths:—

1,000 METRES: Ships *Moreno, Rivadavia, General San Martín, General Belgrano, Pueyrredón, Garibaldi, Buenos Aires, 9 de Julio, Presidente Sarmiento, Pampa, Chaco.*

450 METRES: Ships *Almirante Brown, Libertad, Independencia, Pavand, Rosario, Patría, Córdoba, La Plata, Calamarca, Jujuy, Entre Ríos, Misiones, Corrientes, Guardia Nacional, 1º de Mayo, Ministro Escurrea, Alférez Mackinlay, Ona, Querandi, Asopardo, Piedra Buena, Vicente Fidel López, Uruguay, and Gaviola.*

2. When the distance between ships does not allow of the establishment of wireless communication with the wavelength mentioned above (No. 1) the operator shall use the efficient wavelength that his apparatus may permit.

3. The normal 600 metres wavelength shall be used exclusively for general service between ships and land stations, national or foreign.

4. After the radiotelegraphic communication is established by any means as mentioned above (Nos. 1 and 2), the operator shall endeavour to work, considering the range, with the minimum power required for obtaining effective communication in accordance with the provisions of the London Radiotelegraphic Convention.

5. The synchronisation of the radiotelegraphic stations on board ships of the Navy, shall be controlled and regulated by the Radiotelegraphic Service Department, in accordance with the wavelengths established by Art. 1, and taking into consideration the normal wave of 600 metres.

SUB-SECTION 8.

WIRELESS ON MERCHANTMEN.

ART. 1.—All merchant vessels, whether mechanically propelled or otherwise, carrying fifty or more persons (passengers and crew) must be fitted with a wireless installation in perfect working order, except in the cases referred to in Articles 4, 5 and 6, below.

The above applies to all craft in similar conditions entering or leaving Argentine ports.

ART. 2.—Wireless apparatus in charge of an efficient operator must have at all times a transmitting power of no less than 200 kilowatts for river craft and of no less than 500 for sea craft.

ART. 3.—No ships will be allowed to clear when the above provisions have not been duly complied with, and should captains or ship masters endeavour to avoid or contravene this rule the Superior Port Authority can impose a fine of not less than 1,000 pesos and not exceeding 5,000. Those penalised in that way can appeal to the Federal Court having jurisdiction on the locality where the fault has been committed. The fine will be doubled in cases of repetition of the offence.

ART. 4.—Ships exclusively navigating the rivers of the Republic are exempted from the obligation of carrying wireless on board, but those plying between Argentine and Uruguayan ports on the River Plate and those

employed in the coasting trade must carry radiotelegraphic installations.

ART. 5.—The following are the exceptions to the rule established by Article 1:—

(1) Those ships which only by accident or under exceptional circumstances carry fifty or more passengers, either because the captain has been obliged to get extra help in order to replace the sick members of the crew, or because he has taken aboard the passengers and crew of some vessel in distress.

(2) Those ships on which, by reason of the route they follow or because of the conditions on which they set out to sea, it may be considered that the carrying of a wireless installation would be useless and superfluous.

(3) Those ships where the number of passengers may be raised by exceptional or accidental circumstances to 50 or more, owing to their having received on board these additional passengers in the course of the voyage for the purpose of transshipment, with the additional proviso that such vessels do not go farther than 150 miles from the nearest coast.

(4) Sailing ships of primitive construction such as pontoons and lighters, when it is impossible to fit them with wireless.

ART. 6.—Vessels which have started their voyage without meeting the requirements of these regulations cannot be observed or attended to if, by reason of bad weather or through *force majeure*, they are compelled to seek refuge in Argentine ports.

ART. 7.—All foreign ships carrying wireless installations are divided into three classes according to the classification made regarding ship stations in Article XII of the Regulations annexed to the Radiotelegraphic Convention signed in London on July 5th, 1912. These classes are:—

FIRST CLASS.—Vessels carrying a permanent wireless service.

All vessels fitted to carry 25 or more passengers are included in the *First Class*—

(1) If their average speed be of 15 knots or more.

(2) If they have an average speed of over 13 knots; but only provided they carry 200 or more persons (passengers and crew), and provided also that they traverse a distance of more than 500 nautical miles between two ports of call. These ships, however, may be classified under the second class provided that they maintain a continuous watch.

SECOND CLASS.—Vessels having a limited wireless service.

Those ships fitted to carry 25 or more passengers which for some other reasons may not have been included in the first class are included in this second class.

All ships of the second class must, whilst at sea, keep continuous watch during seven hours every day, and watch also for ten minutes at the beginning of each of the remaining seventeen hours.

THIRD CLASS.—To this class belong those ships, national or foreign, carrying a wireless installation without any fixed working hours or not included in the first and second classes.

The owner or builder of a ship included in the second or third class has the right to demand that in the certificate of safety issued to him mention be made of the fact that the ship belongs to a higher class, provided the vessel fulfils the requirements laid down for the higher class.

ART. 8.—National and foreign ships carrying wireless must keep a constant watch in the following cases:—

(1) Passenger ships running to Montevideo.

(2) All ships belonging to the first class.

(3) Ships belonging to the second class, whenever they are at a distance of over 500 miles from the nearest coast.

(4) (a) Ships carrying more than 50 passengers and which, by reason of their movements, are obliged to navigate at a distance of over 1,000 miles from the nearest coast.

(b) Fishing craft, including whalers, on board of which wireless telegraphy must be carried, are not obliged to keep a continuous watch.

(c) The continuous watch above referred to must be carried out by two or more first-class qualified telegraphists, as provided for in Article X of the Regulations annexed to the Convention.

ART. 9.—Any ship which must carry wireless and which is classified in the first or second class must have an emergency installation, in accordance with Article XI of the Regulations annexed to the Radiotelegraphic Convention.

In every case, the emergency installation shall be placed in its entirety on the upper deck of the ship and should be located as high up as possible.

The emergency installation must have a source of energy of its own, must be of such a nature that it can be set in motion very rapidly, and must be capable to work for a minimum of six continuous hours and possess a range of 150 kilometres.

This emergency installation is not required in the case of those ships whose *normal* installations fulfil all the requirements demanded by this Article (as enumerated in the preceding clause).

The licence referred to in Article IX of the Regulations annexed to the International Radiotelegraphic Convention cannot be granted if the installation fails to comply with the requirements demanded by the said Convention and by the present Regulations.

ART. 10.—All points raised in the Radiotelegraphic International Convention and its Regulations which affect ship stations, the transmission of messages, and the issue of certificates to wireless operators, are governed by the following:—

(1) The Rules laid down in the above-mentioned Convention and its Regulations, as well as all the amending Regulations which may from time to time be substituted for them.

(2) The present Regulations whenever their provisions can be considered as additions to the above.

SUB-SECTION 9.

RULES FOR WIRELESS INSTALLATIONS ON NATIONAL MERCHANTMEN.

ART. 1.—All Shipping Companies whose vessels are included in the Regulations laid down in Wireless Law No. 9127 must obtain a permit from the Ministry of Marine and through the Prefect-General of Ports for the installation of wireless stations on their ships.

ART. 2.—Wireless stations on national ships devoted to the conveyance of passengers will be classified as belonging to the first class, and wireless stations on cargo boats will be included in the second class (Article XIII of the Service Regulations annexed to the Wireless Convention).

When Shipping Companies apply for permission to instal wireless in their vessels they

must indicate the class occupied by such vessels, and this classification must be verified by the Office of the Prefect-General of Ports before forwarding the application to the Secretary-General of the Ministry of Marine.

ART. 3.—As soon as the permit has been granted, and immediately after the stations have been erected on the ship, the company must notify the Prefect-General of Ports, so that the latter may—after previous inspection by the wireless inspector—issue the corresponding licence through the Chief of the Maritime Wireless Service. This licence will be handed over as soon as the charge of 5 pesos (national currency) for the defrayment of expenses has been paid.

ART. 4.—The Ministry of Marine will grant the licence:—

(a) If the wireless installation fulfils all the requirements of the law in the matter of range and also if the installation belongs to a system permitting of its being tuned to the wavelengths specified in the London Wireless Convention, within an approximation of 5 per cent.

(b) If a deposit to the order of the Director General of Posts and Telegraphs has been made in the "Banco de la Nación Argentina" of the amount previously fixed by this office as a guarantee for the exchange of radiograms. This deposit must amount at least to one hundred pesos, national currency.

(c) The depositors shall not dispose of the deposit (as provided in (b)) unless they previously notify the administration that their vessels are going to discontinue their registered service, and that sufficient time has elapsed to effect the final liquidation of accounts for radiograms exchanged.

(d) Stations on board ships from a country with which no agreements have been entered into for the exchange of radiograms (between our stations and its ships), will be subject to the conditions (b) and (c). In this case the deposit must be made, before any service is rendered, by the agents of the shipping company owning the vessel.

ART. 5.—Wireless installations on ships belonging to the national merchant service must be furnished with the following papers:—

(1) The licence authorising the installation.
(2) One copy of the London Wireless Convention.

(3) One copy of the Wireless Law.
(4) One copy of the Wireless Regulations.
(5) The Official List of Wireless Stations, and alphabetical list of call letters.

(6) Radiogram forms.
(7) One copy of the standing wireless rates, which must be kept where it can be plainly seen.

(8) One slate, placed outside the wireless cabin, so that the names of those stations within range may be noted thereon for the information of the public.

ART. 6.—The stations on board national merchantmen must be disposed in such a way that the State's stations may receive the waves emitted by the former.

ART. 7.—Radiotelegraphists are forbidden to operate in unlicensed stations.

It is their duty to report to the Prefect-General of Ports any tentative to compel them to disregard this prohibition.

ART. 8.—(a) When a "licence" is issued the station receives its call letters, which will

be published in the Official List of Radiotelegraphic Stations issued by the Berne International Telegraphic Bureau.

Stations licensed for public service "must not use," not even for private purposes, other call letters than those assigned them by the Director of the Maritime Public Radiotelegraphic Service.

(b) The operators in charge of the stations will be responsible for any infringement of the above provision.

ART. 9.—(a) Operators in charge of public service stations are responsible to the Director of the Maritime Public Radiotelegraphic Service for the fulfilment of the provisions contained in the Regulations in force at the time and in the International Radiotelegraphic Convention.

The manager of a station is the chief of the staff serving in the same, and if it is a ship station the manager is responsible to the ship's captain.

The operator in charge of a ship station owes obedience to the captain, and if the latter gives an order against the rules or the International Convention, the operator has the right, acting with tact and courtesy, to call the captain's attention to the fact, pointing out to him at the same time how to avoid the infringement of the rules in carrying through the order received.

(b) The operator in charge shall keep a "book of orders of the station," the pages of which must be numbered. It is forbidden to detach leaves from this book and to use erasers on its pages.

A record will be kept in this book of all orders received from officers with authority to issue them, such as the ship's captain, his substitute, the inspectors representing a Prefect of Ports, etc. Every order will be marked with a number, and in a marginal note the operator will state the date and hour in which it was received; also the place, whenever possible.

The book of orders will be considered as an official document jointly with the "watch book" (*libro de guardia*). The two books will be referred to in case of a lawsuit originated from infringement of the regulations or through other causes.

Whenever required by a competent authority this book shall be submitted for inspection.

Opposite the order (to this effect), in a marginal note, the operator will record the date and hour in which he complied with it.

(c) The operator in charge is responsible for the "service" of the station; therefore, he must see to it that all measures are taken to insure the most efficient service the class of the station calls for—as given in the licence issued by the Director of the Maritime Public Radiotelegraphic Service.

(d) Only the operator in charge is responsible for the accounts or bookkeeping of the station and, unless express orders to the contrary are given, he must prepare the balance-sheets and vouchers thereof.

ART. 10.—The operators in charge of a radiotelegraphic station where an emergency station has been installed according to specifications in the Convention, must verify the perfect running of the emergency station before weighing anchor. The experiments to be carried in this case will be purely local, being limited to the test of the generator, the oscillating circuit and the receiving apparatus.

However, if the operator in charge is in

doubt as to the range or satisfactory running of the whole set, he may ask any coast station to listen to his call in order to perform any test he may judge necessary. When acting in this way the operator will use the abbreviations given in the international list.

The test will be carried through in this way: the operator will ask for a certain time (*un cierto tiempo*) the transmission of the signal **•••••** in order to verify the receiving set; afterwards, the operator will send the same signal using the emergency transmitting apparatus, thus testing its efficiency and the wavelength.

The operator of the station will record in his "watch book" all the remarks suggested by the test and the result of same. If the emergency station is found deficient in some respect, the operator will report to the captain so that he may give the necessary orders to have it repaired and in working order, according to the International Convention.

ART. 11.—When a national merchant ship happens to enter a zone where naval manœuvres are being performed by men-of-war using their wireless, the merchant ship must ask for a licence from the chief of operations to send her messages to the land stations, and in so doing she must state the approximate time that will be required to transmit the traffic in hand.

In these communications both the man-of-war and the merchant ship will use the prefix "T.R."

ART. 12.—Whenever these Regulations are infringed information about the facts will be gathered, and in view of the evidence fines will be imposed, according to the national and international laws and regulations governing the telegraphic and radiotelegraphic services. The payment of the fines will not prevent further legal action, as may be required by the nature of the fault.

A "licence" may be cancelled if the findings in the summary show the convenience of so doing.

SUB-SECTION 10.

OFFICIAL CLASSIFICATION, RATES, COLLECTIONS, AND ACCOUNTS IN ALL KINDS OF RADIOTELEGRAPHIC STATIONS.

ART. 1.—To make up and liquidate the accounts concerning radiograms received from the public at coast stations, the following method will be observed:

(a) If there is no postal or telegraph office in the locality, the money corresponding to this service will be paid to the Post and Telegraphs Treasury through the Administrative Section under the Director-General of the Ministry of Marine.

(b) If there is a postal or telegraph office in town, the payments referred to in (a) will be made to it, daily, the wireless coast station getting a receipt for every remittance.

(c) In places where there is a telegraph office, the coast station shall receive messages from the public when the former is out of connection with the telegram system, and the tolls collected will be paid by the latter to the telegraph office, as stated in (b).

ART. 2.—Radiograms from the personnel of the national Navy and ships belonging to other State services will be exempted of the tolls caused at the State ship and coast stations, but not of those corresponding to the land lines.

When such radiograms as those referred to in this article do not use land lines, their transmission will be charged according to the lowest (*simple*) telegraph rates.

ART. 3.—The personnel of the Navy shall be able to make use, without charge, of radiotelegraphy for affairs of service connected with their functions, providing that the interchange is effected directly between stations of the Navy and without the intervention of any other system of communication. This class of radiotelegram shall bear the prefix "R.S.," and will not be forwarded without the sanction of the officer in command. As regards transmission, they will take priority over the "D.P." radios.

ART. 4.—The collection of tolls on private radiograms from ships of the Navy or other public services is subject to the following rules:—

(a) Radiograms from the personnel mentioned in Art. 2 and those addressed to any of the national wireless stations to be forwarded by land lines to men in the service, are subject to the ordinary telegraph rates and the amount in full must be paid to the operator or chief of the station, just as telegraphic messages are paid for in land offices. The operator will issue in every instance a receipt of the amount collected.

(b) Every day the operator in charge will hand over to the ship's purser the money received for private messages sent out, and the purser will give a receipt of the amount.

(c) The pursers of ships stationed between La Plata and the Buenos Aires ports will pay out every month to the Arsenal Administrative Department the money received from the operators in charge. This payment to be made according to paragraph (a), Art. 1, of this Sub-section.

(d) The same operation will take effect every month in the arsenal and ships anchored in the military port, where the Administrative Department will hand over the money received directly to the Telegraph office at that port.

(e) In the case of ships out at sea, the deliveries of money will take place as stated in paragraphs (c) and (d), the payments to be made within twenty-four hours of arrival at their jurisdictional port, if such arrival occurs after the day fixed for settlement of accounts.

ART. 5.—Any claim arisen from differences in the accounts submitted will be presented by the Director-General of National Posts and Telegraphs to the Chief of the Maritime Public Radiotelegraphic Service.

ART. 6.—Ships and service sections with wireless stations belonging to Ministries (other than the Interior and Marine) will settle the radiotelegraphic accounts according to agreements they will enter into with the Director-General of Posts and Telegraphs.

ART. 7.—Shipping companies will settle monthly their accounts with the Administration of Posts and Telegraphs. The settlement will be made according to the statement of account that the latter office will prepare and forward to every shipping company.

ART. 8.—Telegraph and radiotelegraph rates at present in force are those published in the pamphlet "National Postal and Telegraphic Schedule of Charges" 1917 edition, and in the "Official List" of International Radiotelegraphic Stations.

National stations will apply the rates therein given.

ART. 9.—With the amount of tolls collected in the public service by the State's and National Shipping Companies' stations (which amounts

are paid to the Administration of Posts and Telegraphs as provided in these Regulations) the following documents will be submitted: the list of radiograms exchanged with the necessary information to identify them, and the original of every message sent, relayed and received.

These originals will be placed in a sealed envelope, to be opened only by the Administration of Posts and Telegraphs.

ART. 10.—One copy of the list (mentioned in Art. 9) shall be sent in the first five days of every month to the Radiotelegraphic Department, Ministry of Marine. Shipping companies' stations shall forward these lists through the office of the Prefect-General of Ports.

ART. 11.—A separate list will be made of the official radiograms exchanged between the Navy units and between these units and the national coast stations, when the last is their final destination. This list will be sent only to the Radiotelegraphic Department, also in the first five days of every month, and must be accompanied by the originals of the radiograms exchanged (received, relayed, and transmitted) as provided by Art. 9.

ART. 12.—Coast and ship tolls will be liquidated between the Director-General of Posts and Telegraphs and the foreign administrations or companies controlling the stations intervening in the exchange of radiograms, according to Art. XIII of International Radiotelegraphic Regulations.

ART. 13.—The tolls collected on account of public service radiotelegrams exchanged direct between ships owned by the same company shall not be paid to the Administration of Posts and Telegraphs, but the corresponding list of messages and their originals shall be supplied as provided above.

ART. 14.—The accounts for direct radiotelegraphic exchange between Argentine merchant ships or between Argentine and foreign ships will be settled between the respective companies, and to this effect in each case the receiving station will make the corresponding charge to the transmitting station, but the list of messages and the originals of the messages exchanged will be supplied by the stations on board national ships.

ART. 15.—The Director-General of Posts and Telegraphs shall include in the official list of telegraphic offices the data *re* national licensed coast and ship stations existing in the country, and the list will be kept for reference and consultation by the public at every telegraph office in the Republic. The necessary information to prepare this list—as detailed below—will be supplied by the Ministry of Marine to the Director of Posts and Telegraphs, viz.:—

(a) *Inland and Coast Stations.*—Name, geographical position as shown by the territorial sub-division of the country, and longitude and latitude of the place.

(b) *Ship Stations.*—Name of the vessel, and—if essential—name of the owner or owners.

(c) Call letters. (Every group of call letters must contain three letters and shall be differently arranged for each station.)

(d) Normal range.

(e) Radiotelegraphic system employed and characteristics of the transmitting set.

(f) The several wavelengths employed by the station. The normal wavelength to be underlined.

(f) Class of service rendered by the station (communication with ships, general public correspondence, private correspondence, long-distance public correspondence, special correspondence, exclusively official, etc.).

(g) Service hours of the station.

(h) The time and how the signals are sent out, and the meteorological notices, when the station attends to this kind of service.

(i) Coast and ship rates.

The list will contain, as well, the information communicated to the Berne Bureau relating to radiotelegraphic stations not opened for general public correspondence.

In designing radiotelegraphic stations, the following abbreviations will be made use of:—

PG—Station open to general public correspondence.

PR—Station open to restricted public correspondence.

P—Private station (*Estación de interés privado*).

O—Station open exclusively to official correspondence.

N—Permanent Service Station.

X—Station without fixed hours service.

In cases of homonymy, the name of a ship station will be immediately followed—in the first column of the list—by the corresponding call letters.

ART. 16.—In the counting of words to collect the tolls, the rules given in the regulations annexed to the Petrograd Convention will be followed.

ART. 17.—The originals of public service radiograms and all documents appertaining to same will be safely kept by the Director-General of Posts and Telegraphs during fifteen months, counting from the month following that in which the originals were received at that office.

ART. 18.—Reimbursements originated by the exchange of radiograms with the State's stations will be settled in accordance with the provisions of the International Telegraphic and Radiotelegraphic Convention.

ART. 19.—In the application of the schedule of charges corresponding to messages issued from or addressed to radiotelegraphic stations established in places where no telegraph office is in existence, such stations will be considered as national telegraph offices and the radiotelegraphic rates will be applied only to messages exchanged with ship stations.

CHAPTER III.

NAVY RADIOTELEGRAPHIC STATIONS SERVICE.

SUB-SECTION I.

STATION'S STAFF—DUTIES AND POWERS.

ART. 1.—The staff in every station will consist of one operator in charge and the number of subordinate trained operators required to keep the watch. The number of these operators will be fixed by the Radiotelegraphic Department.

In case of vacancy or temporary absence from the station of the operator in charge, his place will be filled by the operator of highest category or, between men of the same category, by the senior in the service.

Operators in charge shall depend directly from the signal officers.

ART. 2.—The operator in charge is responsible to the Department or to the signal officers—as the case may be—both for the proper

running and upkeep of the station apparatus and for any lack of attention in the performance of the service. The operator in charge, however, may have the responsibility devolved upon the subordinate who was in the watch at the time the breakdown or inattention took place.

ART. 3.—When the station is short-handed, the operator in charge will do watch duty as the subordinate, but the former will be at liberty to choose the hours for his watch.

ART. 4.—The hours of watch corresponding to each operator will be fixed beforehand, considering the class of service to be rendered and the number of men on the staff of the station.

ART. 5.—Ship commanders or managers of other public services have authority to increase temporarily the staff of the stations depending from them, when, on account of manœuvres or other similar service, they consider it essential to insure efficient communications.

ART. 6.—To define justly the responsibility attaching to each operator in connection with breakdowns in the apparatus or omissions in the fulfilment of duties, each operator on taking up his watch will sign in the watch book an entry stating the condition in which he receives the apparatus, the hour of his coming in and all other particulars that may help later on to establish responsibilities. This entry shall be signed also by the operator leaving the work.

ART. 7.—Every time a watch is relieved the operator going out will communicate to his relief all information in his possession concerning the service and useful in the proper performance of the duties.

ART. 8.—When, on account of atmospheric discharges, it is dangerous to keep the apparatus ready to work, the antenna shall be connected to earth, and this fact will be recorded in the watch book stating the hour in which the interruption took effect and that in which connection for work was re-established. During the period of interruption, the operator shall test the atmospheric conditions every thirty minutes, and he will reconnect the antenna immediately the discharges cease.

ART. 9.—The managers of special services and the commanders of ships shall see that the archives of radiotelegrams—official and private—are kept in due order and with all the information required; also the stub-book of receipts. To this effect the signal officer or the officer in charge of the bookkeeping will inspect the station with due frequency.

ART. 10.—The *Dársena Norte* station is the "Service Central Station," and upon its call the other stations shall stop their communications unless the messages are *very urgent*, in which case the transmission shall be carried on to the end. "Very urgent" messages are those asking for assistance and those transmitting orders from H.E. the President of the Republic, the Minister of Marine and the commanders of fleets engaged in manœuvres.

ART. 11.—Time service in force for coast and fixed ship stations is as follows:—

Dársena Norte	Permanent (N)
Rio Santiago	.. ..
Faro Recalada	(Recalada
Lighthouse)	.. ..
	0900—1100,
	1400—1600,
	2000—2400.

Pontón estacionario de Prácticos (Stationary Pilots' Pontoon) " "

Faro Mogotes	(Mogotes	
Lighthouse)	.. ..	Permanent (N)
Puerto Militar	(Military	
Port)	.. ..	" "
Comodoro Rivadavia	.. ..	" "
Cabo Virgenes	.. ..	" "
Año Nuevo	.. ..	1800—0600
Rio Grande	.. ..	0600—1800
Ushuaia	.. ..	Permanent (N)
La Paz	.. ..	2400—1200
Posadas	.. ..	" "
Formosa	.. ..	" "
Puerto Aguirre	.. ..	" "
San Julian	.. ..	Permanent (N)

ART. 12.—Commanders of ships navigating along or towards Argentine coasts will have observed on their "R.T." stations the following hours:—

Ships with three or more radio-telegraph operators	Permanent service.
Ships with two operators	0700—1100
" " "	1400—1800
" " "	2000—2400
Ships with one operator	0800—1100
" " "	1400—1600
" " "	2100—2300

Whenever a complaint is made, a full explanation as to the reasons of delay or other cause of complaint shall be given, and to this effect a record of the facts will be entered in a special Watch Book. This book will be kept by the operator in charge and viséed by the signal officer. Coast stations may call at any hour the ship they want to communicate with. In case of delay, the coast station will regulate its work so as to pick up the ship station at the first opportunity.

Ship commanders may call at any hour the permanent service stations, but, in normal circumstances, they should arrange their calls to other stations in accordance with the latter's hours of working.

Calls for assistance are to be made at any time they are required.

Stations with intermittent service shall attend an urgent call the moment it is heard, whether or not within their regular service hours.

For the purposes of this Article the hour is four hours later than G.M.T.

SUB-SECTION 2.

GENERAL RULES.

ART. 1.—It is absolutely forbidden to the operators to maintain dialogues by wireless; their conversations will, in every instance, be limited to the subjects strictly essential to render a good service.

ART. 2.—Whenever a radiogram is transmitted with a delay of more than thirty minutes after it was handed in, it shall be endorsed with an explanation of the delay which is to be recorded in the watch book.

ART. 3.—When a station calls repeatedly for another and cannot get an answer in more than five minutes, the fact will be recorded in the watch book and also the object of the call. Other stations within the range of the calling station shall record, as well, the call and the omission to answer it. These records will serve to establish the responsibility for possible delays in the transmission or reception of messages.

ART. 4.—When a station "causes a wait" (*da una espera*) of more than ten minutes, the two stations concerned shall record the fact in their respective watch books, the transmitting station giving the classification of the radiogram it has for transmission, and the receiving station the cause of the "wait."

The transmitting station shall remind every ten minutes the receiving station of its being waiting, and the reminders will continue until the radiogram in hand is transmitted.

ART. 5.—Whenever trouble occurs in the receiving apparatus causing a delay of more than ten minutes, a record of the nature of the trouble will be made in the watch book in order to fix responsibilities. The operator in charge will make a similar record whenever he is unable to answer a call through lack of current in the transmitting set, the burning out of a fuse, or other like accident.

ART. 6.—While two stations are in communication, it is absolutely forbidden to the others to interrupt them by calling out a third station, unless the call is to transmit a "very urgent" radiogram or a "general call" from the flagship. However, even in the cases just mentioned the interruption should be made only at the moment the station that is sending messages completes one of them. When this is accomplished the interrupting station shall give the signal of general interruption and the prefix corresponding to either of the very urgent messages above mentioned, which are to have priority in transmission and reception.

ART. 7.—When a ship moors at a port, Navy yard or dockyard, her wireless plant will be closed after a thorough cleaning of its parts.

ART. 8.—To avoid the damages which are likely to occur in wireless stations of resonant spark, on account of the spark gaps being short circuited, the electrodes shall be thoroughly cleaned once a week.

The officer on duty shall be present at the cleaning and will see that it is made properly and thoroughly. To ascertain that the operation has been carried through without impairing the efficiency of the apparatus, the officer will remove the mica washers and will see whether—without them—the contact between each pair of electrodes is perfectly uniform both in the copper rings and the silver discs.

ART. 9.—Radiograms referring to urgent family matters of men in the Navy service, and issued from a Navy ship *Dársena Norte* station, may be sent thence to destination by telephone, if the sender so desires. This will not alter the charges provided the expression "T.C. Naval" follows the signature.

ART. 10.—Arsenal and dockyard commanders shall take care that the radiotelegraph operators under their command attend in the most thorough manner to the cleaning and maintenance in good order of wireless apparatus on board ships anchored therein. The same commanders will see to it that the operators practise with reasonable frequency in sending and receiving messages.

ART. 11.—It is the duty of the staff of a ship station anchored in a Navy yard or military zone to serve in the land stations in the neighbourhood. If one of the latter is closed for repairs, the operators shall report for duty at the station on board the ship appointed to replace the temporarily closed station.

When the number of available operators is rather large, the commander of the Navy yard or the military zone will appoint the hours of service corresponding to each operator.

ART. 12.—Complaints referring to misdirected, altered, or delayed radiograms should be forwarded by the sender of the message to

the captain of the ship whence it was transmitted.

The complaint must contain the number of the radiogram, the hour of transmission, the receiving station, and the name and address of the addressee.

The ship commander will give the necessary instructions to have the information supplied duly checked and all the papers referring to the case shall be sent to the Secretary-General of the Ministry.

Every complaint must refer to one radiogram only.

SUB-SECTION 3.

SPECIAL BOOK-KEEPING OF THE NAVY STATIONS.

ART. 1.—All coast and ship stations shall forward to the Radiotelegraphic Department, Ministry of Marine, in the first five days of every month, two copies of the sheets showing the monthly traffic of both official and public radiograms.

The same stations shall forward, every quarter, a statement of the supplies spent and a requisition of the supplies wanted.

ART. 2.—As often there are divergencies in the international radiotelegraphic service as to the number of words contained in the radiograms sent and received abroad through stations in national men-of-war, these ships shall forward to the Radiotelegraphic Department, Ministry of Marine, an authenticated copy of every message exchanged between them and foreign stations.

Such copies shall be forwarded immediately after the arrival of ships in home waters, so that the Department will be in advance in a position to answer the Administration of Posts and Telegraphs consultations on this subject.

ART. 3.—In all matters relating to management and book-keeping, independent radiotelegraphic stations shall address direct to the Radiotelegraphic Department.

DECREE NO. 1 OF OCTOBER 13, 1919.

Buenos Aires, October 13th, 1919.

The Executive Power of the Nation decrees:

ART. 1.—All restrictions imposed having reference to the use of radiotelegraph installations on merchant vessels are removed.

ART. 2.—Merchant vessels shall not make use of their transmitting apparatus on entering the zone comprised within a radius of five nautical miles of the radiotelegraph stations open to public service, and during such period as they remain in that zone. Nevertheless they shall be able to use their transmitters in case of urgent necessity to make calls for assistance.

ART. 3.—A final period of six months is granted for Argentine merchant vessels to comply with the conditions stipulated by the General Regulations of the Radiotelegraph Service.

ART. 4.—At the General Prefecture of Ports an Office of Radiotelegraph Inspection shall be brought into operation which will see that merchant vessels comply with the stipulations of the International Radiotelegraph Convention of London and the General Regulations as regards the Radiotelegraph Service.

ART. 5.—This decree to be communicated, published, etc., etc.

(Sd.) IRIGOYEN, JULIO MORENO.

DECREE NO. 2 OF OCTOBER 13, 1919.

Buenos Aires, October 13th, 1919.

The Executive Power of the Nation decrees:

ART. 1.—Authorises the "División Servicio Radiotelegrafico" to arrange for the Radiotelegraph Works of the Navy to carry out, on board merchant vessels entering the ports, all work that may be required by the radiotelegraph stations of those vessels.

ART. 2.—On the termination of the work the amount incurred as regards wages and materials with an additional charge of 10 per cent. as compensation for the use of machinery and costs of administration shall be liquidated the amount in question to be paid by the

captain or shipowner before the vessel leaves the port.

ART. 3.—The sums collected in this manner shall be paid over by the "División Servicio Radiotelegrafico" to the Treasury of the General Administrative Authorities, so that in due course they may be paid to the General Treasury of the Nation and credit granted for the items destined for the radiotelegraph stations of the Navy.

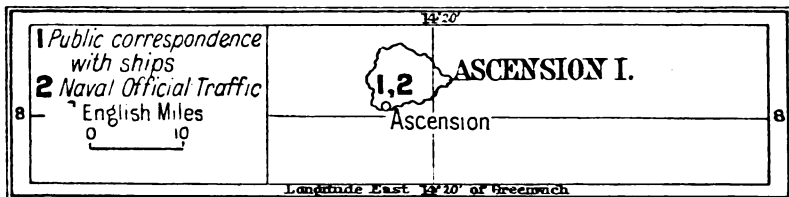
ART. 4.—The Radiotelegraph Inspectorate of the General Prefecture of Ports shall make this Decree known to captains and shipowners.

ART. 5.—This decree to be communicated, published, etc., etc.

(Sd.) IRIGOYEN, JULIO MORENO.

ASCENSION ISLAND

THIS isolated island lies, at its nearest point, about 900 miles from the mainland of Africa (Liberia) and possesses something less than 200 inhabitants. The wireless telegraph station belongs to, and is worked by, the Admiralty, but it is open to public correspondence with ships.



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AUSTRALIA

THE area of the continent itself is 2,948,366 English square miles, whilst the inclusion of the island of Tasmania, which possesses an area of 26,215 square miles, brings the gross superficies to a total of 2,974,581 square miles.

The Government is a Federal Commonwealth Government—the Executive power vested in the Sovereign (acting through the Governor-General) assisted by the Executive Council of seven Ministers of State and such honorary Ministers as may be appointed thereto. The constitution rests on the fundamental law of March 16th, 1898, ratified by the Imperial Parliament on July 9th, 1900, and the Commonwealth was inaugurated January 1st, 1901.

CONTROL AND ORGANISATION.

Originally radiotelegraphy was organised in Australia under the supervision of the Postmaster-General, the Naval Department exercising jurisdiction independently over their own radiotelegraph stations. In 1915 this duplication was abolished; the control throughout the entire Commonwealth being definitely placed in the hands of the Naval Authorities. It is understood, however, that the early transfer of the control of the Commonwealth Radio Service from the Department of the Navy to the Postmaster-General's Department may be expected. The first sets erected were those at Point Lonsdale, in Victoria, and that near Devonport, Tasmania. Both of them date from 1905.

The land stations controlled by the Government are twenty-two in number.

There are no private land stations.

There are a number of ship stations on Government vessels as well as on vessels privately owned.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Rt. Hon. Sir Joseph Cook, G.C.M.G...	Minister of the Navy	Sydney
F. G. Cresswell, R.A.N.	Acting Director of Radiotelegraphic Service	Sydney
A. F. Newman, R.A.N.	His principal Assistants	
G. J. Weston, R.A.N.		
W. T. S. Crawford		
F. G. Cresswell, R.A.N.	Chief Engineer (Wireless Section)	Sydney
C. B. Cutler	His principal Assistants	
A. S. McDonald		
S. Rolls		

ADMINISTRATION.

The Act to Regulate Radiotelegraphy in Australasia was passed in 1905. A number of additions and modifications were introduced by Wireless Telegraphy Acts No. 33 of 1915 and No. 4 of 1919, and this amended text will be found below, it being the extant Governing Decree under which wireless is at present administered.

In 1912 the Commonwealth Parliament passed the Navigation Act, wherein is contained a clause which makes it compulsory for ships trading in Australian waters to be fitted with radiotelegraphic apparatus. This is provided for in Section 231 of the Act, and the text of that section will be found below with other information in accordance with the following list.

We append the text of current radiotelegraphic legislation in accordance with the following list.

A—Wireless Telegraph Act, 1905 (No. 8), as amended by Act No. 33 of 1915 and Act No. 4 of 1919.

B—Wireless Telegraph Regulations, 1916 (embodying Amendments made up to Statutory Rule 68 of 1920).

C—Form of Ship Licence.

D—Form of Receiving Licence for Amateurs.

E—Form of Transmitting and Receiving Licence for Amateurs.

F—Navigation Act, 1912 (Sec. 231).

ACT No. 8 OF 1905.

(As amended by the Wireless Telegraphy Acts, No. 33 of 1915 and No. 4 of 1919.)

A 1. *Short Title.*—This Act may be cited as the Wireless Telegraphy Act, 1905.

2. *Interpretation.*—In this Act—
“Australia” includes the territorial waters of the Commonwealth and any territory of the Commonwealth;

“Wireless Telegraphy” includes all systems of transmitting and receiving telegraphic or telephonic messages by means of electricity without a continuous metallic connection between the transmitter and the receiver.

3. *Exemption of Ships of War.*—This Act shall not apply to ships belonging to the King's Navy.

4. *Exclusive Privileges.*—The Minister for the time being administering the Act shall have the exclusive privilege of establishing, erecting, maintaining and using stations and appliances for the purpose of—

(a) transmitting messages by wireless telegraphy within Australia, and receiving messages so transmitted, and

(b) transmitting messages by wireless telegraphy from Australia to any place or ship outside Australia, and

(c) receiving in Australia messages transmitted by wireless telegraphy from any place or ship outside Australia.

5. *Licences.*—Licences to establish, erect, maintain, or use stations and appliances for the purpose of transmitting or receiving messages by means of wireless telegraphy may

be granted by the Minister for the time being administering the Act for such terms and on such conditions and on payment of such fees as are prescribed.

6. *Penalty for Breach of Act.*—(1) Except as authorised by or under this Act, no person shall—

(a) establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy; or

(b) transmit or receive messages by wireless telegraphy.

Penalty: Five hundred pounds, or imprisonment with or without hard labour for a term not exceeding Five years.

Ships fitted with Apparatus for Wireless Telegraphy.—(2) Sub-section (1) of this section shall not, except as prescribed, extend to appliances maintained on any ship, arriving from any place beyond Australia, for the purpose of enabling messages to be transmitted from or received on that ship by means of wireless telegraphy, but all such appliances shall, while the ship is within Australia—

(a) be subject to the control of the Minister for the time being administering the Act; and

(b) only be used by his authority or as authorised by the regulations.

Penalty: Five hundred pounds.

7. *Forfeiture of Appliances Unlawfully Erected.*—All appliances erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless

telegraphy, shall be forfeited to the King for the use of the Commonwealth.

8. *Search Warrants for Appliances Unlawfully Erected.*—(1) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that any appliance is established, erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless telegraphy, he may grant a search warrant to any person.

(2) A search warrant under this section shall authorise the person to whom it is addressed to break and enter any place or ship, where the appliance is or is supposed to be, either by day or by night, and to seize all appliances which appear to him to be used or intended to be used for transmitting or receiving messages by means of wireless telegraphy.

9. *Proceedings in Respect of Offences.*—(1) Proceedings for any offence against this Act may be instituted in any Court of Summary Jurisdiction, and any person proceeded against under this section may be dealt with summarily or may be committed for trial.

(2) The Court in dealing summarily with any accused person under this section may, if he is found guilty of any offence against this Act, punish him by imprisonment with or without hard labour for any period not exceeding six months, or by a penalty not exceeding Fifty pounds.

10. *Regulations.*—The Governor-General may make regulations, not inconsistent with this Act, prescribing all matters which by this Act are required or permitted to be prescribed or which are necessary or convenient to be prescribed for carrying out or giving effect to this Act.

DEPARTMENT OF RADIO SERVICE.

REGULATIONS UNDER THE "WIRELESS TELEGRAPHY ACT, 1905-19."

WIRELESS TELEGRAPHY REGULATIONS.

SHORT TITLE.

B 1.—These Regulations may be cited as the "Wireless Telegraphy Regulations 1916."

DEFINITIONS.

2.—In these Regulations unless the contrary intention appears—

"Australian ship" means a ship registered in Australia;

"British ship" means a British ship other than an Australian ship;

"Foreign ship" means a ship other than an Australian ship or a British ship;

"Harbour" includes any harbour properly so called, whether natural or artificial, or any estuary, navigable river, pier, jetty, or other work in or at which a ship can obtain shelter, or ship or unship goods or passengers;

"Land station" means a station, not being a ship station, for the transmission and receipt of messages by means of wireless telegraphy;

"Ship station" means a ship (not permanently moored) having installed thereon appliances for the transmission and receipt of messages by means of wireless telegraphy;

"Territorial waters" means the territorial waters of the Commonwealth and those of any territory of the Commonwealth, and includes harbours;

"The Act" means the "Wireless Telegraphy Act," 1905-1915;

"The Minister" means "The Minister of State for the Navy";

"Naval Board" means the Naval Board of Administration appointed under the Naval Defence Act;

"The Secretary for the Navy" means the Secretary to the Naval Board of Administration.

3. Repealed.

LICENCES.

4. (i) Licences under section 5 of the Act may be (a) ship licences or (b) experimental and instructional licences. Licences shall be in accordance with the forms prescribed at the end of these Regulations.

(ii) A ship licence shall be granted only in respect of a ship station on an Australian ship.

(iii) An experimental and instructional licence may be granted to technical schools and similar institutions, and to persons for instructional purposes or scientific investigation of wireless telegraphy or wireless telephony phenomena, subject to the applicant producing satisfactory proof of his competency to conduct experiments scientifically.

(iv) A licence shall be for a period of one year from the date thereof, and may be renewed from time to time.

FEES.

5. (i) The fee for a ship licence shall be One pound, and shall be paid in advance.

(ii) The fee for an experimental and instructional licence shall be Two pounds, and shall be paid in advance.

APPLICATION FOR LICENCES.

6. (i) An application for a ship licence must be in writing, and must set out the following particulars:

(a) The name of the ship in respect of which the licence is applied for;

(b) The port in Australia at which the ship is registered;

(c) The system of wireless telegraphy to be used on the ship.

(ii) Before granting the licence the Minister may require the applicant to furnish such additional particulars as he thinks necessary.

(iii) Experimental and instructional licences shall only be granted to applicants who are natural-born British subjects, and who reside in Australia.

(iv) An application for an experimental and instructional licence must be in writing, and must set out the following particulars:—

(a) Name in full, age, residence, previous training and present occupation, nationality, and parents' nationality.

(b) The scientific, technical, practical, or other grounds upon which it is desired to obtain a licence;

(c) Complete diagram of connection and description of the apparatus it is intended to use.

CONDITION AS TO SYNTONY, ETC.

7. Before any licence is granted, the applicant must satisfy the Minister that the wireless telegraphy apparatus or appliances to be worked in pursuance of the licence complies with the regulations for the time being in force governing syntony and wavelength.

8. (i) Every ship licence shall be made out in triplicate. Two parts shall be issued to the licensee, and the other retained in the Department of the Navy.

(ii) Before the licence is issued to the applicant he shall execute the part of the licence to be retained in the Department.

RENEWAL OF A LICENCE.

9. (1) A licence may be renewed by writing thereon or attaching thereto a memorandum stating the period for which it is renewed.

(2) The memorandum of renewal must be signed by the Minister or by the Naval Secretary.

(3) The renewal may be made at any time within one month before or one month after the expiry of the licence.

(4) The memorandum is to be written on each part of the licence, but in the case of the licensee's parts it shall be in the form of an official receipt for the renewal fee signed by the Minister or Naval Secretary, or by any person authorised to receive moneys on behalf of the Department of the Navy. Such receipts are to be attached by the licensee to the parts of the licence in his possession.

REVOCATION OF LICENCE.

10. The Minister may, by notice in writing revoke and determine any licence, on the ground of the licensee having failed to comply with any regulation for the time being in force under the Wireless Telegraphy Act 1905-1919, or on any other ground specified in the licence.

TUNED CRYSTALLITE RECEIVERS.

10A. (1) All vessels licensed under the Wireless Telegraphy Act 1905-1919 of the Commonwealth of Australia and fitted with wireless telegraphy installations operating or trading in the territorial waters of the Commonwealth or adjacent islands under the Commonwealth control shall be equipped with tuned crystallite receivers or receivers of the gas bulb or electrolytic type. Other receivers suitable for connecting to the detector terminals of the "Marconi" multiple tuner may be utilised when fitted with suitable transformer, and provided that the tuning and sensitivity are of equal efficiency to that obtained from a receiver specially designed for use with crystallite detectors.

(2) Vessels affected by this regulation shall take immediate action to comply with same; but the Naval Board may, if circumstances of supplies warrant it, grant an extension of time for the fitting of the apparatus required by this regulation for a period not exceeding three months from the date of the issue of this regulation.

POWERS OF INSPECTION.

11. The Naval Board or any person authorised in writing by the Naval Board may at all reasonable times enter upon any ship or land station on which wireless telegraphy appliances are installed, or are in course of being installed in pursuance of a licence, and may inspect such appliances and the working and user thereof.

COMMUNICATIONS BETWEEN SHIP AND LAND STATIONS.

12. When communications are made by means of wireless telegraphy between a ship (whether British, foreign or Australian) in territorial waters and a wireless telegraph station on land, the rules in force for the working of wireless telegraphy at that station shall be observed.

APPLICATION OF THE RADIOTELEGRAPHIC CONVENTION AND REGULATIONS.

13. The provisions of the Radiotelegraphic Convention and the Service Regulations for the time being in force thereunder, so far as such Convention and Regulations are applicable, shall apply to all wireless telegraphy installations available for the transmission or receipt of private messages, whether installed by the

Commonwealth or under licence, and whether at land stations or ship stations, and to all messages handled by such installations, and every licensee shall comply therewith.

APPLIANCES TO BE WORKED SO AS TO AVOID INTERFERENCE WITH OTHER APPLIANCES.

14. (1) The wireless telegraphy appliances on board any ship (whether an Australian ship, a British ship, or a foreign ship) in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(a) Naval or Military signalling; or

(b) the transmission of messages between other wireless telegraph stations.

(2) In this regulation Naval or Military signalling includes signalling or communicating, by means of any system of wireless telegraphy, by the King's Imperial or Dominion Naval or Military Forces.

APPLIANCES NOT TO BE WORKED WHILE SHIP MOORED TO ANY WHARF OR PIER.

15. Except by permission of the Naval Board, the wireless telegraphy appliances on board any Australian ship, British ship, or foreign ship (other than a ship of war) shall not be worked or used while the ship is moored to any wharf or pier in Australia or any territory of the Commonwealth.

APPLICATION OF DEFENCE REGULATIONS TO FOREIGN SHIPS OF WAR IN HARBOURS.

16. The use of wireless telegraphy appliances on board any foreign ship of war while in any harbour in Australia or any territory of the Commonwealth, shall be subject to such rules (whether prohibitive or regulative) as the Governor-General may think fit to make.

POWERS OF GOVERNOR-GENERAL IN EMERGENCIES.

17. If at any time an emergency has arisen in which it is expedient that the Commonwealth Government should have control over the transmission of all messages by wireless telegraphy, the Governor-General may by notice in the *Gazette* prohibit for such period as he thinks necessary the use of wireless telegraphy on board foreign ships in territorial waters.

CONTROL OF COMMUNICATIONS AND APPLIANCES IN EMERGENCIES.

18. (1) In case of emergency, the Naval Board or any officer in command of any ship of war of His Majesty's Navy (whether Imperial or Dominion), or any officer in command of any part of the Defence Force, may—

(a) take possession of any wireless telegraph appliances installed on any ship in pursuance of a licence, and use such appliances for the King's service; or

(b) place any person in control of any such appliances; or

(c) direct the licensee or person in charge of such appliances to submit to him all or any messages tendered for transmission or received by means of such appliances; or

(d) stop or delay or direct the licensee or person in charge of such appliances to stop or delay the transmission or delivery of any such messages or to deliver them to him; or

(e) direct the licensee or person in charge of such appliances to comply with all such directions as he thinks fit to give with reference to the transmission or receipt of messages by means of such appliances.

(2) Every licensee and every person in charge of any wireless telegraphy appliances installed in pursuance of a licence shall comply with this

regulation, and all directions issued in pursuance thereof.

(3) Reasonable compensation shall be payable to the licensee for any damage to the appliances arising in consequence of the exercise of the powers conferred by this regulation.

(4) The Minister may notwithstanding anything contained in a licence issued to a licensee under the Wireless Telegraphy Regulations 1916 by order published in the *Gazette*, prohibit for such time as he directs any licensee from communicating with any radiotelegraph station licensed by, or belonging to, or in any country which is at war with His Majesty the King or the possessions thereof.

(5) Any order under sub-regulation (4) of this regulation may prohibit all communications whatever, or may prohibit communications to particular stations or under special circumstances.

OPERATORS' PROFICIENCY CERTIFICATES.

19. (1) Every ship station in respect of which a licence is issued must be operated by a person or persons holding a certificate of competency or certificates of competency issued by the Naval Board after examination, or by the Postmaster-General of the United Kingdom, or by the proper authority in any part of the British Empire.

(2) Certificates of competency shall only be issued to natural-born British subjects, both of whose parents are natural-born British subjects:

Provided that—

(a) a certificate of competency shall not be issued to any person who, or either of whose parents, has at any time been a subject of a country with which the United Kingdom is now at war; and

(b) in the case of a person who, or either of whose parents, has, at any time, been a subject, or a citizen, as the case may be, of a country which is an ally of Great Britain in the present war, or which has remained neutral during the present war, a certificate of competency may be issued or withheld by the Naval Board as the Naval Board determines according to the merits of the case.

(2A) Certificates of competency shall be of two classes, namely:—

(a) first class—issued to persons over eighteen years of age capable of receiving and transmitting by sound at a speed which must not be less than twenty words per minute; and

(b) second class—issued to persons over eighteen years of age capable of receiving and transmitting by sound at a speed which must not be less than twelve words per minute.

(3) A fee of Ten shillings shall be paid by the candidate on each occasion on which such candidate is examined. A certificate of competency may be issued at a charge of Five shillings to each candidate who satisfactorily passes the prescribed examination, and in the event of a certificate being lost a fee of Ten shillings shall be paid for the first copy of such certificate, One pound for the second copy, and Two pounds for any subsequent copies, provided that the Naval Board may authorise the issue of a duplicate or copy of a certificate without charge where it has been shown that the original certificate has been lost or destroyed in circumstances over which the holder had no control.

In case of failure a candidate shall not be re-examined in any system or under any circumstances until after the lapse of three months.

(4) If a person to whom a certificate of competency has been issued by the Naval Board—

(a) is convicted of a criminal offence; or

(b) is, on account of incompetence, or for any other reason, considered by the Naval Board to be unsuitable to continue to hold the certificate,

the Naval Board may withdraw, cancel, or suspend the certificate.

USE OF WIRELESS TELEGRAPHY FOR MILITARY PURPOSES.

20. These regulations shall not prevent the use, without licence, by the military authorities of wireless telegraphy for military purposes. Provided that each wireless telegraphy installation (other than a mere temporary installation) to be used shall be authorised in writing by the Naval Board.

CHARGES.

21. The total charges for messages transmitted and received for any duly authorised Wireless Station within the Commonwealth or licensed under the Wireless Telegraphy Act 1905-1915 shall include:—

(a) the coast charge which belongs to the coast station;

(b) the ship charge which belongs to the ship station;

(c) the charge for transmission over the lines of the telegraph system (where necessary); and

(d) delivery charges (where necessary).

22. The rates for messages transmitted to or received from ship stations shall be as follows:—

(1) For ordinary messages—

(a) Coast station transmitting or receiving charge—

(i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 3d. per word;

(ii) Radiotelegrams to or from other ships, 6d. per word.

(b) Ship station transmitting or receiving charge—

(i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 2d. per word;

(ii) Radiotelegrams to or from other ships, not exceeding 4d. per word.

(c) Land line charge 1d. per word.

(2) For press messages—

(a) Coast station transmitting or receiving charge—

1½d. per word.

(b) Ship station transmitting or receiving charge—

Not exceeding 4d. per word, as determined by the ship authorities concerned;

(c) Land line charge, ½d. per word, odd fractions of one penny to be reckoned as one penny.

(3) For messages to or from ships of the British or Australian Navies—

(a) For official messages—

(i) There shall be no coast station charge.

(ii) There shall be no ship station charge.

(iii) Land line charge, 1d. per word.

(b) For private messages—

The rates and conditions shown in sub-regulation (1) of this regulation shall apply.

(4) For messages consisting of reports to Lloyd's agents concerning marine casualties and overdue vessels:—

(a) Coast station charge, 6d. per word.

(b) Land line charge, 1d. per word.

The charges for these messages shall be collected from the addressee.

(5) The charge for relaying radiotelegrams, irrespective of the number of coast stations concerned in the relaying, shall be:—

(a) When the ships of origin and of destination are both licensed in Australia or New Zealand, 4d. per word;

(b) When only one of the ships concerned or when neither of the ships concerned is licensed in Australia or New Zealand, 7d. per word.

23. (1) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on islands within the Commonwealth Administration or between any stations established on such islands except Flinders Island and King Island shall be—

(a) For ordinary messages one penny per word per radio station involved, plus ordinary land line charges for telegrams within the Commonwealth.

(b) For press messages (except Port Moresby and Samarai) (per station involved)—

	s.	d.
Not exceeding 25 words	1	3
Exceeding 25 but not exceeding 50	2	6
Exceeding 50 but not exceeding 100	5	0
Every additional 50 words or portion of 50 words	2	6

plus ordinary land line charges for press telegrams within the Commonwealth.

(c) For press messages to and from Port Moresby and Samarai (per station involved)—

	s.	d.
Not exceeding 25 words	0	7½
Exceeding 25 but not exceeding 50 words	1	3
Exceeding 50 but not exceeding 100 words	2	6
Every additional 50 words or portion of 50 words	1	3

plus ordinary land line charges for press messages within the Commonwealth.

(2) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on King and Flinders Islands shall be—

(a) For ordinary messages one halfpenny per word per radio station involved, with a minimum of One shilling per message plus ordinary land line charges for telegrams within the Commonwealth;

(b) For press messages (per station involved)—

	s.	d.
Not exceeding 25 words	0	7½
Exceeding 25 but not exceeding 50 words	1	3
Exceeding 50 but not exceeding 100 words	2	6
Every additional 50 words or portion of 50 words	1	3

plus ordinary land line charges for press telegrams within the Commonwealth.

(3) For messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 3d. per word plus the ordinary land line charges for telegrams within the Commonwealth, for such land line handling as is involved.

(4) For press messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 1d. per word plus the ordinary land line charges for press telegrams within the Commonwealth, for such land line handling as is involved.

(5) The rates for the radiotelegraphic trans-

mission of deferred and week-end telegrams shall be one-half and one-quarter of the ordinary rates respectively.

(6) Delivery charges, if any, shall in all cases be paid by the addressee.

24. Repealed.

25. The total charge for messages transmitted to or from ships shall be paid by the sender.

PRESS RADIOTELEGRAMS FOR PUBLICATION ON SHIPS.

26. (1) Press radiotelegrams for publication on ships shall be addressed to the commander of a ship, or to a newspaper published on board a ship, and shall bear in the address the words "for publication," which words shall be charged for at press rates.

(2) The information contained in such press radiotelegrams must either be published in a ship's newspaper or posted on a ship's public notice board.

(3) Press radiotelegrams shall, subject to this regulation, comply with the provisions of Articles 64 and 65 of the detailed regulations attached to the International Telegraph Convention.

REFUNDS.

27. The full charge for a radiotelegram will be refunded when such radiotelegram is rendered useless through a fault of the telegraph service, and the full charge, less land-line charges, will be refunded when a radiotelegram cannot be delivered on account of the ship of destination having passed out of range.

TRANSMISSION OF SHIPPING INTELLIGENCE BY TELEPHONE.

28. Information received at a coast station from vessels at sea, indicating the noon or midnight position, will be communicated by telephone to the owners or agents of such vessels on payment of One shilling per communication.

OCEAN FORECASTS AND WEATHER REPORTS.

29. Ocean forecasts sent by the Commonwealth Meteorologist will be transmitted from radiotelegraph stations owned, operated, and maintained by or on behalf of the Minister to vessels at sea and weather reports received at such radiotelegraph stations from vessels at sea, and addressed to the Commonwealth Meteorologist, will be transmitted, on payment of the following charges:—

For each communication not exceeding 20 words, 2s.; for each additional word, 1d.; plus one penny per word land line charge.

REPEAL.

30. All regulations previously made under the Wireless Telegraphy Act 1905-1919, and in force at the commencement of these Regulations, are hereby repealed save as to any right, privilege, or obligation acquired, accrued, or incurred thereunder.

SHIP'S LICENCE. FORM OF LICENCE.

Dated 19

Commonwealth of Australia.
THE MINISTER FOR THE NAVY
to

C

LICENCE TO ESTABLISH A WIRELESS TELEGRAPH SHIP STATION.

To all to whom these presents shall come, I the Honourable the Minister for the Navy of the Commonwealth of Australia
SEND GREETING :

graph Regulations" mean respectively the International Convention of St. Petersburg, dated the 10th-22nd July, 1875, and the Service Regulations made thereunder, and include respectively any modifications of the Convention or Regulations made from time to time.

The expression "the Radiotelegraphic Convention 1912" means the Convention signed at London on the 5th day of July, 1912, and the Service Regulations made thereunder, and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. The licensed apparatus shall not be used by the licensee or by any other person, either on behalf or by permission of the licensee, for the transmission or receipt of messages except messages authorised by this licence.

3. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with naval signalling.

(2) Stations using wavelengths longer than those set apart for naval purposes shall not emit any subsidiary waves or harmonics likely to interfere with signalling or the commercial wavelengths or naval wavelengths in the vicinity.

(3) If the Admiralty or the Minister for the Navy is of opinion that the working of the licensed apparatus specified in the First Schedule hereto is inconsistent with the free use of naval signalling, the licensee shall when required in writing by the Minister for the Navy so to do, close the said station.

(4) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. For the purpose of this licence, the licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

5. The licensee shall observe the provisions of any Regulations from time to time made under the Wireless Telegraphy Act 1905-1915 so far as the same are applicable to the licensee.

6. The licensee shall observe the provisions of the Radiotelegraphic Convention 1912.

7. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Minister for the Navy from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

8. The licensed apparatus shall not, without the consent of the Minister for the Navy, be altered or modified in respect of any of the particulars mentioned in the Schedules hereto.

9. The apparatus shall include such emergency installation as may be required according to the

class of the ship station under the provisions of Article XI of the Service Regulations annexed to the Radiotelegraph Convention 1912.

10. The licensee shall at all times indemnify the Minister for the Navy against all actions, claims, and demands which may be brought or made by any corporation, company, or person in respect of any injury arising from any act licensed or permitted by these presents.

11. (1) Subject to the provisions of this licence, the licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or preference, whether as regards rates of charge, order of transmission, or otherwise. Provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

(2) In respect of messages transmitted on behalf of His Majesty's Government or the Government of the Commonwealth the licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

12. The licensee shall, so far as possible, receive from ships and light stations all requests for assistance and all signals of distress, and shall answer such requests and signals and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

13. The licensed apparatus at the said ship station shall be worked only by a person or persons holding a certificate or certificates of competency issued by the Minister for the Navy or by the Postmaster-General of the United Kingdom. Certificates of competency shall be granted only to persons who satisfy the Minister for the Navy that they possess the requisite technical proficiency as regards operating and knowledge of the regulations governing signalling, and shall be in such form and subject to such conditions as the Minister for the Navy shall from time to time prescribe.

14. The licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or the Government of the Commonwealth or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and transmitted by naval signalling or by any system of wireless telegraphy provided or maintained by or for the purposes of the Postmaster-General or any Department of His Majesty's Government or the Government of the Commonwealth, or by any licensee of the Minister for the Navy (other than the licensee).

15. The licensee shall keep full accounts records, and registers of all messages transmitted by means of the licensed apparatus, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination, and such further particulars as the Minister for the Navy shall from time to time reasonably require to be shown, messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms, written and printed, and transcripts of messages, and all other papers for such period as is from time to time prescribed by the Radiotelegraphic Convention 1912, and in default of any provisions on the subject in the said Convention for such period as is from time to time prescribed by the International Telegraph Regulations, and such

registers and message papers shall be open to the inspection of the Minister for the Navy or his officers thereto authorised at the head office of the licensee in between the hours of 10 a.m. and 5 p.m. on every day, except Sunday or a Statute or general holiday.

15. The Minister for the Navy and any agent authorised in that behalf in writing by him may at all reasonable times enter upon the ship station hereby licensed for the purpose of inspecting, and may inspect any apparatus fixed or being in such station for the purpose of sending and receiving messages by wireless telegraphy, and all other telegraphic instruments and apparatus fixed or being in such station, and the working and use of such apparatus and telegraphic instruments.

17. The licensee shall carry on every ship at which a ship station is established under this licence a print or copy of the licence certified under the hand of an appropriate officer of the Minister for the Navy to be a true copy, and also such documents as may be prescribed by the Minister for the Navy for the purpose of enabling the licensee to communicate with coast stations in accordance with the Radiotelegraphic Convention 1912.

18. (1) The licensee shall pay to the Minister for the Navy for and in respect of the licence hereby granted a fee of One pound per annum.

(2) The fee payable under this licence shall be payable before the issue of the licence, and the fee payable upon the renewal of the licence shall be payable before such renewal.

19. Except with the consent in writing of the Minister for the Navy, the licensee shall not assign, underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licence powers or authorities hereby granted.

20. (1) If and whenever an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for any officer in command of any ship of war of His Majesty's Navy to cause the licensed apparatus, or any part thereof, to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer may seem fit, and in that event any person authorised by the said officer may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

(2) Any such officer may in such event as aforesaid, instead of taking possession of the licensed apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus, either wholly or partly, and in such manner as he may direct, and such persons may enter upon any ship on which any apparatus is installed accordingly, or the said officer may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus, or any class or classes of such messages to stop or delay the transmission of any messages, or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer may prescribe, and the licensee shall obey and conform to all such directions.

(3) The licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

21. In any of the following cases (that is to say):—

(a) In case of any sum of money which ought to be paid by the licensee to the Minister for the Navy, under or by virtue of these presents, shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the covenants herein contained;

(b) In case of any breach, non-observance, or non-performance by or on the part of the licensee of any of the covenants (other than a covenant for the payment of money) or conditions herein contained, and on the part of the licensee to be observed and performed; or

(c) In case the licensee fails to comply with any regulation for the time being in force under the Wireless Telegraphy Act 1905-1915;

then and in any such case the Minister for the Navy may by notice in writing revoke and determine these presents, and the licence, powers, and authorities hereinbefore granted, and thereupon these presents and the said licence, powers, and authorities shall absolutely cease, determine, and become void but without prejudice to any right of action or remedy which shall have accrued or shall thereafter accrue to the Minister for the Navy under the covenants on the part of the licensee herein contained.

22. Nothing in these presents contained shall prejudice or affect the right of the Minister for the Navy from time to time to establish, extend, maintain, and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Minister for the Navy from time to time to enter into agreements for or to grant licences relative to the working and use of telegraphs (whether of a like nature to those hereby licensed or otherwise) or to the transmission of messages in any part of the Commonwealth or any Territory under the control of the Commonwealth by means of wireless telegraphy, or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Minister for the Navy by or under the Post and Telegraph Act 1901-1910 or the Wireless Telegraphy Act 1905-1915.

23. Any notice, request, or consent (whether expressed to be in writing or not) to be given by the Minister for the Navy under these presents may be under the hand of the Minister for the Navy or any Minister or officer authorised by the Minister for the Navy to act on his behalf, and may be served by sending the same in a registered letter addressed to the licensee at the usual or last-known place of residence or business of the licensee, and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Naval Secretary at his official address within the Commonwealth.

SCHEDULE I.

PARTICULARS OF THE SHIP STATION REFERRED TO IN THIS LICENCE.

Name of ship on which Station is established.	Class of ship under Radiotelegraphic Convention.	Nature of services performed.	Hours of service.	Normal Range of signalling in nautical miles.		Character of apparatus		Power.	If alternator is used. Number of cycles per second.
				By night.	By day.	System of Radiotelegraphy and characteristics of the system of emission.	Wavelength in metres.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Other particulars :—

SCHEDULE II.

COMPLETE SCHEME OF CONNECTIONS AUTHORIZED TO BE EMPLOYED IN THE HEREIN LICENSED STATION.

This drawing, which is purely diagrammatic, shows the circuits authorised to be employed in both the transmitter and receiver.

Signed, sealed, and delivered by the Minister for the Navy in the presence of (L.S.)

Signed, sealed, and delivered by the Licensee in the presence of (L.S.)

FORM OF RECEIVING LICENCE FOR AMATEURS.

DNo. _____
Dated _____ 19____

COMMONWEALTH OF AUSTRALIA.

LICENCE TO USE WIRELESS TELEGRAPHY OR TELEPHONY FOR EXPERIMENTAL PURPOSES.

To all to whom these presents shall come, I the Honourable the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 send greeting.

Whereas
of
in the State of
(hereinafter called "the licensee") is desirous of establishing, erecting, maintaining, and using a system of wireless telegraphy or telephony as defined in section 2 of the Wireless Telegraphy Act 1905-1919 with the sole object of conducting demonstrations or experiments in wireless telegraphy or telephony. And whereas by reason of the provisions of the Post and Telegraph Act 1901-1916, and of the Wireless Telegraphy Act 1905-1919, it is unlawful to establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy or telephony except under and in accordance with a licence

granted in that behalf by the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919, and it is also unlawful, save as in the said Acts provided, to transmit telegrams or other communications by telegraph within the Commonwealth of Australia:

And whereas the licensee has made application for this licence;

Now I, the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 aforesaid, in pursuance of the Wireless Telegraphy Act 1905-1919 and in exercise of all powers and authorities enabling me in this behalf, do hereby grant to the licensee from the date of these presents until these presents are determined as hereinafter provided licence and permission—

(i) To establish, erect, maintain, and use at the station specified in the first and second schedules hereto, appliances for the purpose only of receiving messages by means of wireless telegraphy or telephony (hereinafter called "the licensed appliances") provided that the appliances installed at the station shall be of the character specified in the said first and second schedules; and

(ii) To receive messages by means of wireless telegraphy or telephony at the said station from any experimental station provisionally authorised or fully licensed by the Minister.

Provided that the licensed appliances shall be worked and the messages shall be received solely for the purpose of conducting experiments in wireless telegraphy or telephony, and for no other purpose whatever.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions:—

1. In these presents (and in the schedules hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the

subject or context, repugnant to such construction (that is to say):—

(1) The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1905-1919.

(2) The terms "telegraph" and "telegraph line" have the same meanings as in the Post and Telegraph Act 1901-1916.

(3) The expression "naval signalling" means signalling by means of any system of wireless telegraphy or telephony between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station, and any other wireless telegraph or telephone station, whether on shore or in any ship.

(4) The expression "His Majesty's Navy" or "His Majesty's ships" includes ships being part of the Naval Forces of any part of His Majesty's Dominions.

(5) The expression "Australia" includes the territorial waters of the Commonwealth of Australia and of any territory of the Commonwealth of Australia.

(6) The expression "military signalling" means signalling by means of any system of wireless telegraphy or telephony between two or more sets of appliances for wireless telegraphy or telephony operated by or on behalf of the Military Forces of the Commonwealth of Australia or between one such set of appliances and any other wireless telegraph or telephone station.

(7) The expression "Minister" means the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919.

2. The licensed appliances shall not be used by the licensee or any other person either on behalf or by permission of the licensee for the receipt of messages except messages authorised by this licence.

3. The licensee shall observe the provisions of any regulations from time to time made under the Wireless Telegraphy Act 1905-1919 so far as the same are applicable to the licensee.

4. (a) The licensed appliances shall not without the previous consent in writing of the Minister be altered in respect of any of the particulars mentioned in the first and second schedules hereto.

(b) The licensee shall at all times indemnify the Commonwealth of Australia and the Minister against all actions, claims, and demands which may be brought or made by any corporation, company, or person in respect of any injury arising from any act licensed or permitted by these presents.

5. Neither the licensee nor any person acting on his behalf or by his permission shall divulge to any person (other than properly authorised officials of the Commonwealth of Australia or a competent legal tribunal), or make any use whatever of any message coming to the knowledge of the licensee or any such person as aforesaid and transmitted by naval or military signalling or by any system of wireless telegraphy or telephony provided or maintained by or for the purposes of the Minister or any Department of the Commonwealth of Australia or by any licensee of the Minister.

6. The licensee shall not deliver or cause to be delivered to any person any messages received by him by wireless telegraphy or telephony unless the transmission or delivery of such message has been approved by the Minister or by

an officer duly authorised by him to approve thereof.

7. Officers of the Royal Australian Naval Radio Service and persons thereunto authorised by the Minister may from time to time and at all reasonable times enter upon the station or other premises in the possession or occupation of the licensee for the purpose of inspecting and may inspect any appliances fixed or being in such places respectively for the purpose of receiving messages by wireless telegraphy or telephony and all other telegraphic or telephonic instruments and appliances fixed or being in such stations respectively and the working and the user of such appliances and telegraphic or telephonic instruments respectively.

8. (a) All appliances used or intended to be used under this licence shall be so established, erected, maintained, and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance working or user of any telegraph line of the Postmaster-General which may from time to time exist or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or use thereof.

(b) In case any telegraph line of the Postmaster-General shall be damaged or the efficient working or use thereof shall be wholly or partially interrupted or otherwise interfered with and the Chief Electrical Engineer for the time being of the Postmaster-General's Department shall certify in writing under his hand that such damage interruption or interference has been caused directly or indirectly by any appliances used under this licence, or by anything done by or on behalf or with the permission of the licensee in relation thereto, the licensee shall on demand pay to the Postmaster-General all costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraph lines so as to restore the same to efficient working order and in adding thereto or substituting therefor either temporarily or permanently any other telegraph line if the said Chief Electrical Engineer shall certify that such addition or substitution is reasonably required.

(c) For the purpose of this Article, the expression "telegraph line" has the same meaning as in the Post and Telegraph Act 1901-1916 and the expression "telegraph line of the Postmaster-General" includes a telegraph or telephone line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Commonwealth of Australia or other body or person.

9. The licences powers and authorities hereby granted shall not except with the previous consent in writing of the Minister be assigned transferred sub-let or otherwise disposed of or dealt with and the licensee shall not except with a like consent allow any other person or body to participate in any manner whatsoever in the benefits of such licences powers or authorities.

10. (a) If and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient that His Majesty the King shall have control over the station or premises specified in the first and second schedules hereto and the appliances and instruments thereon it shall be lawful for the Minister to call upon the licensee to hand over to him on behalf of His Majesty the King such station premises appliances and instruments or any part or parts thereof and if the licensee shall comply with such demand the Minister or any person thereunto authorised by him may enter upon such

station or premises and take possession of and use the same together with all appliances and instruments thereon.

(b) The Minister shall during the period the possession and use of the said station premises appliances and instruments are retained on behalf of His Majesty the King reimburse to the licensee all wages and salaries paid by the licensee to persons employed in connection with the said station or premises provided that the employment of such persons is necessary for the proper upkeep of the said station or premises and provided further that such wages or salaries are at the same rates as previously paid by the licensee for similar services.

(c) In the event of the licensee refusing to hand over on demand the said station or premises and the appliances and instruments thereon the Minister may immediately thereupon cancel this licence without prejudice to any steps the Governor-General in Council may think fit to take to obtain possession of such station premises appliances or instruments.

11. The technical details of the herein licensed station are contained in the first schedule hereto, and the complete scheme of connections authorised to be employed is shown in the second schedule hereto.

12. (a) The licensee shall pay to the Minister for and in respect of licence hereby granted a fee of Two pounds (£2) for each year or part of a year the licence is in force in respect of the station at which the licensed apparatus is installed.

(b) The fee shall be payable to the Minister annually in advance.

13. The Minister may at any time in his absolute discretion give notice in writing to revoke and determine these presents and to cancel the licence or permission hereby given at the end of twenty-four hours from the time of service of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Minister under any covenant or provision herein contained on the part of the licensee to be observed and performed.

14. In the event of these presents and the licence or permission hereby given being revoked and determined by the Minister under the power hereinbefore contained or any other power here-

unto enabling him the licensee shall not be entitled to any compensation or damages by reason of the determination.

15. Nothing in these presents contained shall prejudice or affect the right of the Commonwealth of Australia from time to time to establish erect extend maintain and use any system or systems of telegraphic or telephonic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as it shall in its discretion think fit neither shall anything herein contained prejudice or affect the right of the Commonwealth of Australia from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs or telephones (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of Australia by means of wireless telegraphy or telephony or by any other means with or to any person or persons whomsoever upon such terms as it shall in its discretion think fit and (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Post and Telegraph Act 1901-1912 or by the Minister under the Wireless Telegraphy Act 1905-1919.

16. Any notice request or consent (whether expressed to be in writing or not) to be given by or for the Minister under these presents may be under the hand of the Secretary for the time being to the Department being administered by the Minister and may be served by sending the same by registered letter addressed to the licensee at the usual or last known place of residence or business of the licensee and in such case the time of service shall be deemed to mean the time when in the ordinary course of post it would have been delivered to the licensee at such place and any notice to be given by the licensee under these presents may be served by sending the same by registered letter addressed to such secretary at his official address within the Commonwealth.

In witness whereof the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 has hereunto set his hand and seal the day and year first hereinbefore written.

SCHEDULE I.

Names of Station.	Description of Receiving Apparatus.
(1)	(2)

SCHEDULE II.

Complete scheme of connections authorised to be employed in the herein licensed station.

This drawing, purely diagrammatic, shows the circuits authorised to be employed in the receiver.

Signed, sealed, and delivered by the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 in the presence of—

This licence is accepted by me under the provisions and terms and on the conditions above set out.

Signed, sealed, and delivered by the
said licensee in the presence of—)

FORM OF TRANSMITTING AND RECEIVING LICENCE FOR AMATEURS.

No.

Dated

19

COMMONWEALTH OF AUSTRALIA.

E LICENCE TO USE WIRELESS TELEGRAPHY OR TELEPHONY FOR EXPERIMENTAL AND INSTRUCTIONAL PURPOSES.

To all to whom these presents shall come, I, the Honourable the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-19 send greeting:

Whereas
of
in the State of
(hereinafter called "the licensee"), is desirous of establishing, erecting, maintaining, and using a system of wireless telegraphy or telephony as defined in section 2 of the Wireless Telegraphy Act 1905-1919, with the sole object of conducting demonstrations or experiments in wireless telegraphy or telephony: And whereas by reason of the provisions of the Post and Telegraph Act 1901-1916 and of the Wireless Telegraphy Act 1905-1919 it is unlawful to establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy or telephony except under and in accordance with a licence granted in that behalf by the Minister or member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919, and it is also unlawful, save as in the said Acts provided, to transmit telegrams or other communications by telegraph within the Commonwealth of Australia:

And whereas the licensee has made application for this licence:

Now I,
the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 aforesaid, in pursuance of the Wireless Telegraphy Act 1905-1919, and in exercise of all powers and authorities enabling me in this behalf, do hereby grant to the licensee from the date of these presents until these presents are determined as herein-after provided, licence and permission—

(i) To establish, erect, maintain, and use at the station specified in the first and second schedule; hereto appliances for the purpose of *transmitting and receiving messages* by means of wireless telegraphy or telephony (hereinafter called "the licensed appliances"), provided that the appliances installed at the station shall be of the character specified in the said first and second schedules, and operated in accordance with the conditions specified.

Provided that the licensed appliances shall be worked and the messages shall be transmitted and received solely for the purpose of conducting demonstrations in wireless telegraphy or telephony at public lectures or conducting experiments in wireless telegraphy or telephony for the advancement of science and for no other purpose whatever.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions, which may be altered, added to, or modified hereafter to meet public interests or requirements or emergencies.

1. In these presents (and in the schedules hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction (that is to say):—

(1) The expression "wireless telegraphy"

has the same meaning as in the Wireless Telegraphy Act 1905-1919.

(2) The terms "telegraph" and "telegraph line" have the same meaning as in the Post and Telegraph Act 1901-1916.

(3) The expression "naval signalling" means signalling by means of any system of wireless telegraphy or telephony between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph or telephone station, whether on shore or on any ship.

(4) The expression "His Majesty's Navy" or "His Majesty's ships" includes ships being part of the Naval Forces of any part of His Majesty's Dominions.

(5) The expression "Australia" includes the territorial waters of the Commonwealth of Australia and of any territory of the Commonwealth of Australia.

(6) The expression "military signalling" means signalling by means of any system of wireless telegraphy or telephony between two or more sets of appliances for wireless telegraphy or telephony operated by or on behalf of the Military Forces of the Commonwealth of Australia, or between one such set of appliances and any other wireless telegraph or telephone station.

(7) The expression "Minister" means the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919.

2. The licensed appliances shall not be used by the licensee or any other person either on behalf or by permission of the licensee for the transmission or receipt of messages except messages authorised by this licence.

3. The licensee shall observe the provisions of any regulations from time to time made under the Wireless Telegraphy Act 1905-1919 so far as the same are applicable to the licensee.

4. (a) The licensed appliances shall be so worked as not to interfere with the working of any wireless telegraph or telephone station established in Australia by or for the purposes of the Minister for the Navy or any Department of the Commonwealth of Australia, or for commercial purposes, and in particular with the transmission or receipt of any messages between or at wireless telegraph or telephone stations established as aforesaid on land and wireless telegraph or telephone stations established on ships at sea. On no account shall His Majesty's ships be called by means of the licensed appliances.

(b) With a view to preventing such interference as aforesaid the licensee and every person acting on his behalf or by his permission shall comply with all directions which shall be given to the licensee by the Minister or prescribed by the Minister with respect to avoiding interference between one wireless telegraph or telephone station and another.

(c) The licensed appliances shall not without permission, in writing, from the Minister, or an officer thereunto authorised by him, be altered in respect of any of the particulars mentioned in the first and second schedules hereto.

(d) The licensee shall at all times indemnify the Commonwealth of Australia and the Minister against all actions, claims, and demands which may be brought or made by any corporation, company, or person in respect of any injury arising from any act licensed or permitted by these presents,

5. (a) The licensee shall not (either by himself or by any person acting on his behalf or by his permission), by the transmission of any message by means of the licensed appliances or otherwise by the use of the licensed appliances, interfere with naval or military signalling.

(b) Whenever the operators of the said station of the licensee perceive, through the medium of the appliances used by them, that naval or military signalling is proceeding, they shall refrain from using the licensed appliances until all indication that naval or military signalling is proceeding shall have ceased.

(c) These provisions for the protection of naval or military signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

6. Neither the licensee nor any person acting on his behalf or by his permission shall divulge to any person (other than properly authorised officials of the Commonwealth of Australia or a competent legal tribunal), or make any use whatever of any message coming to the knowledge of the licensee or any such person as aforesaid, and transmitted by naval or military signalling or by any system of wireless telegraphy or telephony provided or maintained by or for the purposes of the Minister for Navy or any Department of the Commonwealth of Australia or by any licensee of the Minister other than the licensee.

7. Officers of the Royal Australian Naval Radio Service and persons thereunto authorised by the Minister may from time to time and at all reasonable times enter upon the station or other premises in the possession or occupation of the licensee, for the purpose of inspecting, and may inspect any appliances fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy or telephony and all other telegraphic or telephonic instruments and appliances fixed or being in such stations respectively and the working and the user of such appliances and telegraphic or telephonic instruments respectively.

8. (a) All appliances used or intended to be used under the licence shall be so established, erected, maintained, and used as not either directly, or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working, or user of any telegraph line of the Postmaster-General which may from time to time exist, or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or use thereof.

(b) In case any telegraph line of the Postmaster-General shall be damaged or the efficient working or use thereof shall be wholly or partially interrupted or otherwise interfered with, and the Chief Electrical Engineer for the time being of the Postmaster-General's Department shall certify in writing under his hand that such damage, interruption, or interference has been caused directly or indirectly by any appliances used under this licence, or by anything done by or on behalf or with the permission of the licensee in relation thereto, the licensee shall on demand pay to the Postmaster-General all costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraph lines so as to restore the same to efficient working order, and in adding thereto or substituting therefor either temporarily or permanently any other telegraph line, if the said Chief Electrical Engineer shall certify that such addition or substitution is reasonably required.

(c) For the purpose of this Article, the expression "telegraph line" has the same meaning as in the Post and Telegraph Act 1901-1916, and

the expression "telegraph line of the Postmaster-General" includes a telegraph or telephone line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Commonwealth of Australia or other body or person.

9. Except with the consent in writing of the Minister the licensee shall not assign, underlet, or otherwise dispose of or admit any other person or body to participate in the benefits of the licences, powers, or authorities hereby granted or any of such licences, powers, or authorities.

10. (a) If and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient that His Majesty the King shall have control over the transmission and receipt of messages by the licensed appliances, it shall be lawful for the Minister to call upon the licensee to hand over to him on behalf of His Majesty the King so much of the licensed appliances as is within Australia, or any part thereof, and if the said licensee shall comply with the demand the Minister or any person authorised by him may enter upon and take possession of the station specified in the first and second schedules and use the same together with all appliances and instruments thereon.

(b) The Minister shall, during the period the possession and use of the said station, appliances, and instruments are retained on behalf of His Majesty the King, reimburse to the licensee all wages and salaries paid by the licensee to persons employed in connection with the said station, provided that the employment of such persons is necessary for the proper upkeep of the said station, and provided further that such wages or salaries are at the same rates as previously paid by the licensee for similar services.

(c) In the event of the licensee refusing to hand over the said station and appliances on demand, the Minister may immediately thereupon cancel this licence without prejudice to any steps the Governor-General in Council may think fit to take to obtain possession of the said station and appliances.

11. The technical details of the herein licensed station are contained in the first schedule hereto; and the complete scheme of connections authorised to be employed is shown in the second schedule hereto.

12. (1) The licensee shall pay to the Minister for and in respect of the licence hereby granted a fee of Two pounds (£2) for each year or part of a year the licence is in force in respect of the station at which the licensed apparatus is installed.

(2) The fee shall be payable to the Minister annually in advance.

13. The Minister may at any time in his absolute discretion by notice in writing revoke and determine these presents and cancel the licence or permission hereby given at the end of twenty-four hours from the time of service of such notice, and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly, but without prejudice to any remedy of the Minister under any covenant or provision herein contained on the part of the licensee to be observed and performed.

14. In the event of these presents and the licence or permission hereby given being revoked and determined by the Minister under the power hereinbefore contained or any other power thereunto enabling him, the licensee shall not be entitled to any compensation or damages by reason of the determination.

15. Nothing in these presents contained shall

prejudice or affect the right of the Commonwealth of Australia from time to time to establish, erect, extend, maintain, and use any system or systems of telegraphic or telephonic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as it shall in its discretion think fit, neither shall anything herein contained prejudice or affect the right of the Commonwealth of Australia from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs or telephones (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of Australia by means of wireless telegraphy or telephony or by any other means with or to any person or persons whomsoever, upon such terms as it shall in its discretion think fit, and (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Post and Telegraph Act 1901-1916 or by the Minister by or under the Wireless Telegraphy Act 1905-1919.

16. Any notice, request, or consent (whether expressed to be in writing or not) to be given or

made by or for the Minister under these presents may be under the hand of the Secretary for the time being of the Department being administered by the Minister, and may be served by sending the same by registered letter addressed to the licensee at the usual or last-known place of residence or business of the licensee, and in such case the time of service shall be deemed to mean the time when in the ordinary course of post it would have been delivered to the licensee at such place; and any notice to be given by the licensee under these presents may be served by sending the same by registered letter addressed to such secretary at his official address within the Commonwealth of Australia.

17. The licensee may communicate with any experimental radiotelegraph station provisionally authorised or fully licensed by the Minister for experimental purposes, providing that such communication does not interfere with the conduct of W/T signalling.

In witness whereof the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 has hereunto set his hand and seal the day and year first hereinbefore written.

SCHEDULE I.
CHARACTER OF APPLIANCES.

Name of Licensee and Address of Station.	Description of Transmitting Appliances.	Description of Receiving Appliances.	Wavelength to be employed in Transmitter.	Maximum Watt energy permitted to be employed in Transmitter.
1.	2.	3.	4.	5.
Type of aerial, height, construction				
Nature and voltage of primary power ..				
Transformer; ratio of windings				
Spark gap				
Particulars of transmitting oscillator				
Condenser—Capacity of				
Form of coupling				
Details of earth connections				

SCHEDULE II.

Complete scheme of connections and aerial system authorised to be employed in the herein licensed station.

This drawing, purely diagrammatic, shows the circuits authorised to be employed in both the transmitter and receiver.

Signed, sealed, and delivered by the Minister or Member of the Executive Council for the time being administering the Wireless Telegraphy Act 1905-1919 in the presence of—

This licence is accepted by me under the provisions and terms and on the conditions above set out.

Signed, sealed, and delivered by the said licensee in the presence of—

NAVIGATION ACT.

F The Commonwealth Parliament passed in 1912 a Navigation Act which contains a clause making it compulsory for ships trading in Australian waters to be equipped with apparatus for wireless telegraphy. This matter is dealt with in section 231 of the Act, and the text of the section given below is as under :—

EXTRACT FROM NEW NAVIGATION ACT, 1912.

DIVISION VI.

231. (1) Except as prescribed, every foreign-going ship, Australian trade ship, or ship engaged in the coasting trade, carrying fifty or more persons, including passengers and crew, shall before going to sea from any port in Australia be equipped with an efficient apparatus for wireless communication in good working order in charge of one or more persons holding prescribed certificates of skill in the use of such apparatus.

(2) For the purposes of this section apparatus for wireless communication shall not be deemed to be efficient unless :

(a) It is capable of transmitting and receiving messages over a distance of at least 100 miles, day and night.

(b) The person controlling the operator undertakes in writing to the Minister to exchange, and does, in fact, exchange, as far as may be physically practicable (of which the master shall be the judge) messages with shore or ship stations using

similar or other systems of wireless communication; and

(c) There is provided, in connection with the apparatus, and ready for use whenever from any cause the ordinary supply of electrical power is not available, a battery of accumulators of such capacity as to insure for a period of at least six hours communication of the efficiency prescribed in paragraph (a) of this sub-section.

(3) The equipment shall, if so prescribed, include a silent chamber for the receipt of messages.

(4) The master of a ship required by this section or the regulations to be equipped with wireless telegraphy apparatus shall not take her to sea, and the owner of a ship required to be so equipped shall not permit her to go to sea, unless the requirements of this section have been complied with.

PENALTY: One Thousand Pounds.

(5) The regulations may prescribe the times and hours during which an operator shall be in attendance on the apparatus, ready to receive or transmit messages.

(6) Except as otherwise prescribed, the provisions of this section shall not apply to ships plying exclusively between ports in Australia less than two hundred miles apart.

(7) The Governor-General may make regulations in accordance with the provisions of any International Convention to which the United Kingdom is a party relating to the use of wireless telegraphy on ships, and such regulations may be in addition to, or in substitution either wholly or in part for the provisions of this section.

AUSTRIA

THE republic of German-Austria forms only a very small part of the erstwhile Austro-Hungarian Monarchy, being bounded on the north by Czecho-Slovakia and Germany; on the east by Czecho-Slovakia and Hungary; on the south by Jugo Slavia and Italy; and on the west by Switzerland.

CONTROL.

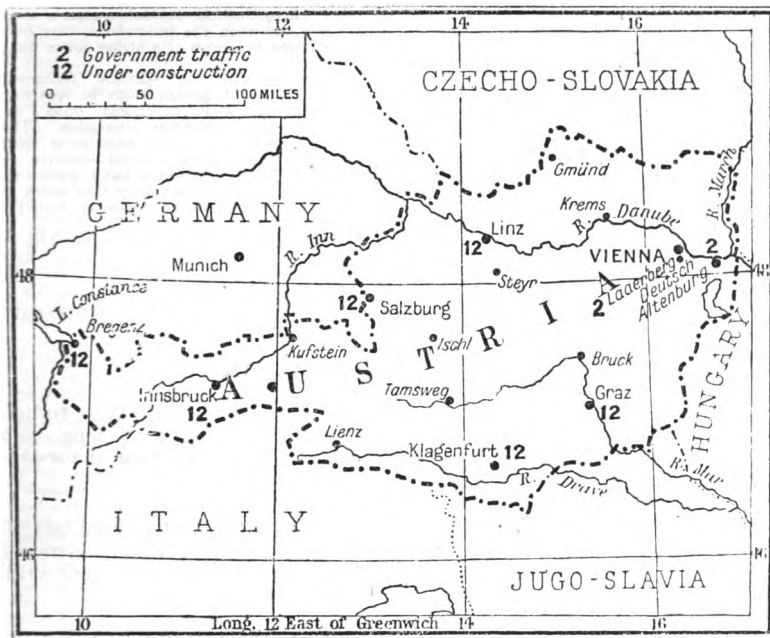
OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. Konrad Hoheisel .. Sektionschef Emil Fodrich	Director-General of Posts and Telegraphs .. Chief of Section VII for Telegraphs, Telephones and Pneumatic Postal Affairs, Public Department of Communications	Vienna. Vienna, A. Borse- platz 1.
Ministerial Councillor Friedrich Teufenstein.	Chief of the Telegraph Department	Vienna.

ORGANISATION.

In Deutsch-Altenburg a 25 kw. transmitting installation was erected in the year 1915, and was instituted as a temporary station for general working. Further, there was available as a reserve a 5 T V installation. As a permanent station the building of a 45 kw. transmitting station in Deutsch-Altenburg was completed in August, 1919, and it started working at that date. The 5 T V station still continues in existence as a reserve station.

At present the Austrian Telegraph Administration possesses a long distance radio station in Deutsch-Altenburg and also one at Laaerberg. The latter is on the Poulsen System. There is also at Laaerberg a receiving



station with Braun frame receivers. These stations are all under the control of Section VII of the Public Department of Communications.

In addition to the above the erection of radio stations at Graz, Lintz, Salzburg, Klagenfurt, Innsbruck and Bregenz is contemplated so that a land radio service may be maintained in Austria.

For the forwarding of correspondence only the radio installations of the State Administration are used in Austria. The other installations, for which concessions have been granted, serve either for experimental purposes or for the testing of radio installations of private firms.

ADMINISTRATION.

The issue of regulations relative to wireless telegraphy in connection with aviation, time, weather, and meteorological reports is under consideration. It is understood that these rules are in preparation, but so far it has not been possible to obtain copies.

The following decree regulates the administration of wireless telegraphy in the Republic:—

A—Decree of Ministry of Commerce, 7th January, 1910.

A The following Decree of the Ministry of Commerce, dated January 7th, 1910, is concerned with wireless telegraph stations in the Austrian Empire, on board Austrian ships, and on ships of foreign nationality in Austrian territorial waters:—

(1) In accordance with a High Decree of Parliament of January 16th, 1847, and the Decree of the Ministry of Commerce, dated April 28th, 1905, the erection and working of Wireless Telegraph stations in the Austrian Empire and on Austrian ships is a State concession to acquire which a written application (liable to Stamp Duty) containing a description

of the station and a diagram of connections, must be submitted.

(2) The choice of system, apparatus, and fixtures, as well as the establishment of coast and land rates within the limits of the Wireless Telegraph Agreement of 1909, and the supplemental regulations are the prerogative of the Ministry of Commerce.

(3) The general regulations for Wireless Telegraph stations on board ships are shown below.

(4) Wireless Telegraph stations on board ships must fulfil the following conditions:—

(a) They must be of equal technical effi-

ciency to systems other than that adopted in the stations, and they must be able to inter-communicate with other systems.

(b) The system adopted must be one of "syntonisation."

(c) The speed of transmission and reception must not, under normal circumstances, be less than twelve words (each of five letters) per minute.

(d) The power possessed by the apparatus must not exceed, in normal conditions, 1 kilowatt. A greater power can be used when the ship is under an obligation to exchange messages at a longer distance than

100 kilometres from the nearest coast station, or when the transmission can only be effected by means of a higher power than specified.

(5) The working of Wireless Telegraph stations on board foreign ships in Austrian territorial waters is dependent upon the previous grant of a State concession. This regulation does not apply to warships or ships in distress. If a foreign vessel employs its Wireless Telegraph station without authorisation, the State authorities may take steps to prevent the working of the station in Austrian territorial waters.

AZORES

(See PORTUGAL.)

BAHAMA ISLANDS

THE Bahamas (or Lucayos) are an archipelago of the British West Indies, lying between $21^{\circ} 42' - 27^{\circ} 34'$ N. lat. and $72^{\circ} 40' - 79^{\circ} 5'$ W. long., and extending from the coast of Florida on the north-west to Haiti on the south-east.

CONTROL AND ORGANISATION.

There is but one radio station in the Colony, and that has been located in Nassau, New Providence. It was installed on August 28th, 1913, is owned by the Colony, and controlled under the authority of the Governor in Council. It is operated by the Telegraph Department.

OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
P. H. Burn	Superintendent and Electrical Engineer ..	Nassau.

ADMINISTRATION.

The Radiotelegraph Act, 1913, regulates the administration of wireless telephony.

A—Radiotelegraphic Act, 1913.

B—Rules made thereunder.

AN ACT

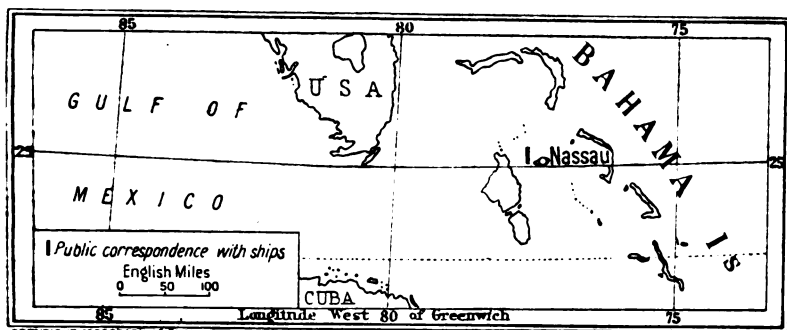
A To amend the Law relating to the Telegraph Department of the Colony. (Assented to on July 7th, 1913.)
May it please the King's Most Excellent Majesty that it may be enacted and be it enacted by his Excellency George Basil Haddon-Smith, Esquire, Companion of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Bahama Islands, the Legislative Council and Assembly of the said Islands, and it is hereby enacted and ordained by the authority of the same as follows:—

1. This Act may be cited as The Telegraph Department Act, 1913.

2. (1) The Telegraph Department shall consist of the Officers set out in the First Schedule to this Act. They shall be appointed by the Governor and shall hold office during pleasure and shall receive annually the respective salaries at the amounts and in the manner set out in the First Schedule to this Act. Provided that the persons holding such

offices at the commencement of this Act shall continue to discharge the duties of such offices and to receive the emoluments thereof without the necessity of new appointment and their services under this Act shall be deemed to be in continuance of their services under any other Act for the purposes of any Act relating to pension or leave of absence or sick leave. Provided also that Patrick Henry Burns, the present holder of the office of Superintendent of Telegraphs and Electrical Engineer, shall continue to receive a salary at and after the rate of £400 a year.

(2) The annual increase of salary provided for in the First Schedule to this Act in the cases of the Clerk and the Operators shall be granted solely at the discretion of the Governor in Council and shall not be granted by him unless and until the Superintendent of Telegraphs and Electrical Engineer certifies that the officer eligible for the increase of salary is thoroughly efficient and reliable in the discharge of the duties of his office, and has discharged such duties in a highly satisfactory manner. Provided that in the case of the present holder



of the office of Clerk the salary of that officer may be increased annually by sums not exceeding £10.

(3) In case of emergency the Governor may, with the approval of the Executive Council, appoint temporarily assistant operators under such terms and conditions and at such salaries as the Governor in Council may prescribe and determine, and any such salaries shall be paid out of the Treasury by warrant in the usual manner. Provided that no such appointment shall be for a longer period than six months.

(4) The Superintendent of Telegraphs and Electrical Engineer may with the approval of the Governor in Council, select and train such number of probationers, being British subjects, as the Governor in Council may determine with a view to the subsequent employment of such probationers under this Act if occasion

shall so require and the Governor in Council shall think fit. No probationer shall be entitled to any payment.

3. No person other than a British subject shall be appointed to any office under this Act.

4. Any person appointed under this Act shall, in addition to any oath required by any Act, take such oaths of secrecy as may be prescribed by any Rules made under The Telegraph Acts 1891 to 1913.

5. The Acts set out in the Second Schedule to this Act shall be and the same are hereby repealed to the extent mentioned in the third column thereof.

6. This Act shall not come into operation unless and until the Governor notifies by Proclamation that it is His Majesty's pleasure not to disallow the same.

SCHEDULE.

REPEALS.

Regnal Year and Chapter.	Short Title.	Extent of Repeal.
55 Vic. c. 1	"The Telegraph Act, 1891" ..	Section 9; the words, "the payment of operators and assistants."
55 Vic. c. 4	"The Telegraph Amendment Act, 1892"	Section 7.
58 Vic. c. 32	"The Retrenchment Act, 1895" ..	Section 1, the words and figures, "Superintendent of Telegraphs, £250."
2 Ed. VII, c. 12 ..	"The Telegraph Clerk's Salary Act, 1902."	The whole Act.

RULES MADE BY THE GOVERNOR IN COUNCIL ON THE 3RD DAY OF NOVEMBER, 1913, UNDER THE AUTHORITY OF THE TELEGRAPH ACTS 1891 TO 1913.

B Paragraphs 1-14 inclusive refer solely to the wired telegraph system.

15. The radiotelegraph system shall be operated under the rules contained in the "Detailed Service Regulations" appended to the International Radiotelegraph Convention signed at London on the 5th day of July, 1912.

A copy of such "Detailed Service Regulations" shall be kept on file in the telegraph offices.

16. All apparatus for radiotelegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(a) Naval signalling, or

(b) the working of any radiotelegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between radiotelegraph stations established as aforesaid on land and radiotelegraph stations established on ships at sea.

17. No apparatus for radiotelegraphy on

board a merchant ship shall be worked or used whilst such ship is in the territorial waters of the Colony, except with the special or general permission in writing of the Governor.

18. Rules 16 and 17 shall not apply to the use of radiotelegraphy for the purpose of making or answering signals of distress.

19. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by radiotelegraphy the use of radiotelegraphy on board merchant ships whilst in the territorial waters of the Colony shall be subject to such further rules as may be made by the Governor in Council from time to time and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

20. The master of any merchant ship on board of which apparatus for radiotelegraphy shall be worked or used contrary to these Rules shall on summary conviction before a Magistrate be liable to a penalty of £200 and

in default of payment to be imprisoned for a period of twelve months.

TARIFF OF CHARGES.

21. From New Providence to the American Coast ninepence-halfpenny a word, plus the charges over the lines of other telegraph administrations, as published in the tariff book of the Western Union Telegraph Company, a copy of which shall be kept on file in the telegraph offices.

From New Providence to radio ship stations, threepence for each word, plus the rate charged by the ship station.

A "Deferred Message Service" at half the ordinary charge per word is in effect between the Bahamas and certain other countries.

A list of such countries and a copy of the rules governing this class of message shall be kept on file in the telegraph offices.

Made by the Governor in Council this 3rd day of November, 1913.

By order,

W. B. HADDON SMITH, Captain.
Clerk to the Executive Council.

BAHREIN ISLANDS

(See PERSIA.)

• BARBADOS

(See map on p. 311.)

BARBADOS (latitude 13° 4' N. and longitude 59° 37' W.) is the most easterly of the West Indian Islands. Its superficial area is reckoned at 166 square miles, or rather more than that of the Isle of Wight. It fell first under British rule in 1605 and has so remained ever since, recording the fact in its most favoured epithet, "Ever British."

CONTROL AND ORGANISATION.

Wireless telegraphy in this Colony owes much to a wireless club formed amongst a number of young Barbadians. Starting with some home-made apparatus, whose aerials were supported on bamboo poles, the local radiotelegraphic station, after the commencement of the late war, developed rapidly, assisted by a private subscription list, which was headed by the Governor and Members of the Legislative Council.

Practical demonstration of its utility became so unmistakable that it has now assumed the form of a regular two-kilowatt installation, maintained for defence purposes, but affording every facility (compatible with military considerations) to merchants and shipping agents. The station is worked in accordance with the International Radiotelegraphic Convention.

This constitutes the only land station in Barbados, and is worked under Government control.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Lieutenant-Engineer E. F. S. Bowen.	Superintendent of Public Works	Barbados.
Sergt. A. D. V. Chase ..	In charge of Wireless Station	Barbados.

The question of the transmission of weather signals is under consideration, but no rules affecting aviation have, so far, been considered.

ADMINISTRATION.

Wireless telegraphy in Barbados is worked under three Acts and one set of regulations, the Barbados Wireless Act of 1905, two Amending Acts, passed in 1913 and 1917, and a number of rules made under these latter acts.

As these are quite distinct, we publish their respective texts below :—

A—Wireless Act, 1905 (confirmed 1908).

B—Wireless and Submarine Telegraph (Amendment) Act, 1913.

C—Wireless and Submarine Telegraph (Amendment) Act, 1917.

D—Rules made under the 1913 and 1917 Acts.

WIRELESS ACT, 1905 (CONFIRMED 1908).

A 1. This Act may be cited as the Wireless and Submarine Telegraph Act, 1905.

2. (1) The West India and Panama Telegraph Company shall not lay down or maintain a new telegraph cable nor shall any other company or person lay down or maintain any telegraph cable upon the foreshore and bed of the sea except under and in accordance with an Act of the Legislature.

(2) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy in any place in this island except under and in accordance with an Act of the Legislature.

(3) If the West India and Panama Telegraph Company lays down or maintains a new telegraph cable or if any other company or person lays down or maintains any telegraph cable upon the foreshore or bed of the sea without the authority of an Act of the Legislature in that behalf, the company or person shall be liable, on conviction before a Police Magistrate to a penalty not exceeding £100, and shall forthwith remove the telegraph cable, and if the telegraph cable be not removed within one day after such conviction the company or person shall be liable to a penalty not exceeding £50 for each day thereafter during which the company or person shall fail to remove the telegraph cable. Provided, that the Governor-in-Executive Committee may at any time after the expiration of one day from the date of the conviction cause the same to be removed and destroyed.

(4) If any person establishes a wireless telegraph station without the authority of an Act of the Legislature in that behalf, or instal or works any apparatus on any place in this island for wireless telegraphy without such authority in that behalf, he shall be liable, on conviction before a Police Magistrate, to a penalty not exceeding £100, and further be liable to forfeit any apparatus for wireless telegraphy installed or worked without such authority.

(5) If a Police Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without legal authority in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place within his jurisdiction without such authority in that behalf, he may grant a search warrant to any police officer named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station or place and to seize any apparatus which appears to him to

have been used, or intended to be used, for wireless telegraphy therein.

(6) No proceedings shall be taken under any of the provisions of this section except by order of the Governor.

WIRELESS ACT, 1913.

Passed on April 11th, 1913.

B 1. This Act may be cited as the Wireless and Submarine Telegraph (Amendment) Act, 1913 (1913-16).

2. (1) *Making of Rules and Regulations.*—The Governor-in-Executive Committee may from time to time make rules and regulations governing the use of wireless telegraph apparatus on merchant ships, British or foreign, while in the territorial waters of this Colony.

(2) *Ratification.*—Such rules and regulations when sanctioned by both Houses of the Legislature and assented to by the Governor, shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(3) *Penalties.*—If the master of such ship or any person on board such ship commits a breach of any of these rules and regulations :—

(a) The ship shall be subject to a maritime lien in favour of His Majesty the King, his heirs and successors, for a sum of one hundred pounds, and the amount so charged may be sued for and recovered in the Colonial Court of Admiralty;

(b) The ship may be detained by force if necessary by the Harbour and Shipping Master or his chief clerk, with the aid of the harbour police, until payment of the lien aforesaid or until arrested under process of the Colonial Court of Admiralty;

(c) The master of such ship shall be liable to a penalty not exceeding fifty pounds.

(d) The person committing the breach shall be liable to a penalty not exceeding fifty pounds.

3. (1) *Special Orders.*—In any case of urgency which is not provided for in the rules and regulations, the Governor may make any special order, and such order shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(2) *Penalties.*—If the master of such ship or any person on board such ship commits a breach of any special order, the ship shall be subject to the maritime lien imposed by section 2 of this Act for the amount therein mentioned and may be detained as is therein provided, and the master, and the person committing the breach, shall be liable to a penalty not exceeding fifty pounds,

AN ACT

C To amend the Wireless and Submarine Telegraph Amendment Act, 1913. (1913-16.)

Be it enacted by the Governor, Council, and Assembly of this island, and by the authority of the same, as follows:—

1. This Act may be cited as the Wireless and Submarine Telegraph (Amendment) Act, 1917.

2. The Wireless and Submarine Telegraph (Amendment) Act, 1913, is hereby amended by inserting the words "and yachts" immediately after the words "merchant ships" in line three of subsection 1 of section 2 thereof, and the word "ship" wherever occurring in the subsequent parts of the Act shall be construed as including a yacht.

3. The Regulations made under the authority of the said Act by the Governor-in-Executive Committee on the thirty-first day of July, nineteen hundred and thirteen, shall apply to yachts as fully and in the same manner in all respects as they do to merchant ships.

RULES MADE BY THE GOVERNOR IN EXECUTIVE COMMITTEE UNDER SECTION 2 (1) OF ACT 1913-16, ON JULY 31ST, 1913, CONFIRMED AUGUST 11TH, 1914.

D 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony

shall be worked in such a way as not to interfere with (a) Naval signalling or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Colonial Secretary of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

BASUTOLAND

(See SOUTH AFRICA, UNION OF.)

BASUTOLAND, an inland native territory of South Africa lying between 28° 45' and 30° 40' S. latitude, and a longitude of 27° 0' and 29° 30' E., is governed by a resident Commissioner under the direction of the High Commissioner for South Africa and located at Maseru, its principal town. The latter high official possesses legislative authority which is exercised by proclamation. The "Territory" covers an area of 11,716 square miles, and has been directly under the authority of the Crown since 1884; it forms an irregular parallelogram on the north-east of the Cape Colony, and the seven districts into which it is divided bear the reputation of including the finest agricultural and pastoral land in South Africa.

ADMINISTRATION.

In 1904 a proclamation was issued, which we print below, making provision for the working of wireless telegraphy within the territory, but at present there are no wireless stations.

A—Proclamation making provision for Wireless Telegraphy.

A PROCLAMATION. No. 5 of 1904.

By His Excellency the High Commissioner for South Africa.

Whereas it is expedient to make provision for the working of wireless telegraphy within the territory of Basutoland;

Now therefore by virtue of the powers in me vested I do hereby proclaim, declare and make known as follows:

1. No person shall establish or use any apparatus or installation for the transmission of messages or other communications by means of electrical energy without the aid of wires without having previously obtained a licence as hereinafter provided.

2. (1) It shall be lawful for the Resident Commissioner to authorise the issue of a licence for either of the purposes mentioned in section 1 and to revoke the same at any time, and there shall be payable in respect of such licence the sum of one hundred pounds.

(2) Every such licence shall be deemed to be granted upon such terms and conditions as the High Commissioner may from time to time prescribe by notice in the *Gazette*.

3. Any person who shall establish or use or attempt to establish or use any such apparatus or installation as is mentioned in section 1 in contravention of the provisions of this Proclamation shall be liable upon conviction to a penalty not exceeding two hundred and

fifty pounds and in default of payment to imprisonment with or without hard labour for a period not exceeding three months and in case of a second or subsequent conviction to a penalty not exceeding five hundred pounds or in default of payment to imprisonment with or without hard labour for a period not exceeding six months.

4. This proclamation shall take effect from the date of its publication in the *Gazette*.

Given under my hand and seal at Johannesburg this twenty-fourth day of February, One thousand nine hundred and four.

MILNER,

High Commissioner.

BELGIAN CONGO

(See page 513 and map on page 120.)

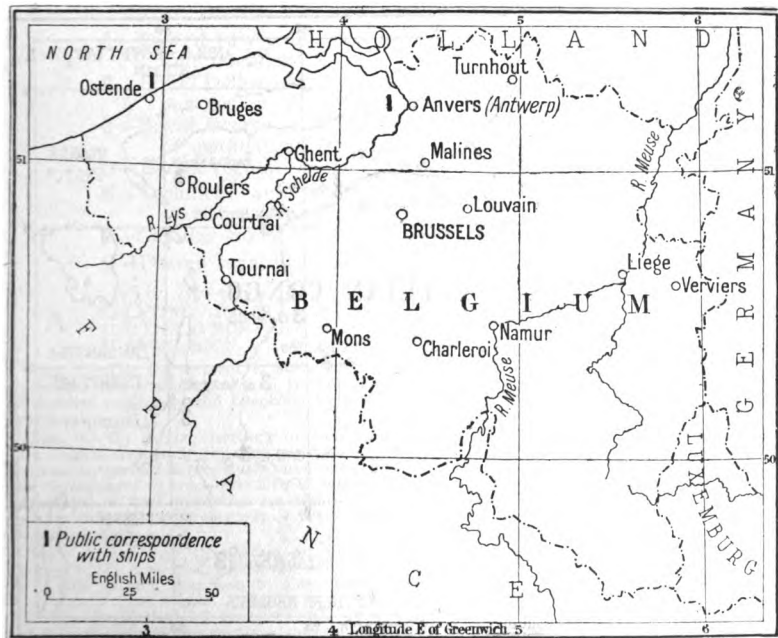
BELGIUM

BELGIUM, after being joined with Holland from 1815, formed itself into an independent State in 1830, under Prince Leopold of Saxe-Coburg, who ascended the throne on July 21st, 1831. According to the constitution of that date, Belgium is "a Constitutional Representative and Hereditary Monarchy," the legislative power being vested in the King, the Senate and the Chamber of Representatives. The present King Albert, born on April 8th, 1875, succeeded his uncle on December 17th, 1909.

The total area of the kingdom was estimated before the war at 11,373 square miles, and was divided into nine provinces, the capital city being Brussels. At the Paris Peace Conference the territory of Eupen, Malmedy and Moresnet was allotted to Belgium.

CONTROL.

Wireless telegraphy in Belgium is under the control of the Telegraph and Telephone Administration, which forms one of the departments of the Ministry of Railways, Marine, Posts and Telegraphs.



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For technical purposes the Administration is divided into two departments and six districts. Each district, administered by an engineer-in-chief and assisted by a principal engineer and other engineers, includes several sections or special technical services.

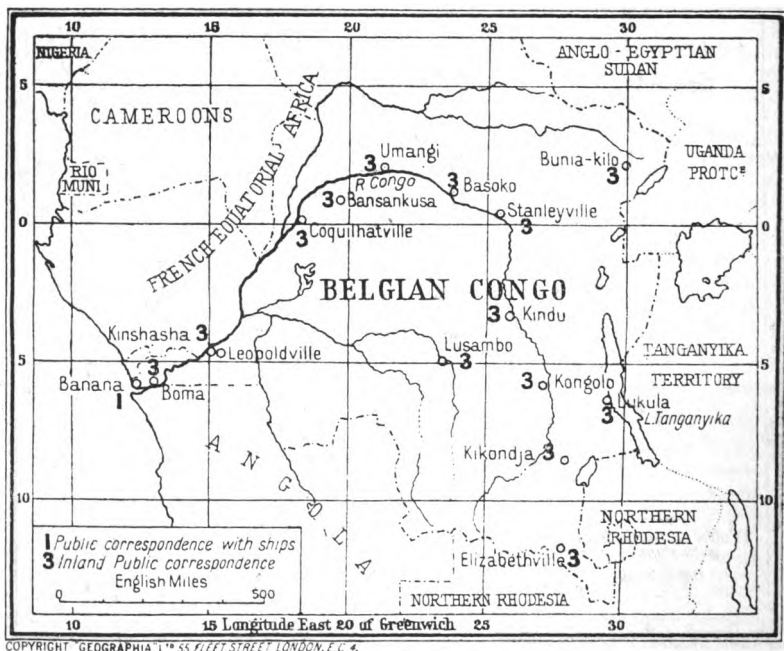
OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Poulet	Minister of Railways, Marine, Posts and Telegraphs ..	Brussels
Mr. A. Roosen	Director-General of Telegraphs and Telephones ..	Do.
Mr. Pierard	Director-General of Marine	Do.
Mr. E. Pierard	Director of Telegraph Administration	Do.
Mr. C. Dussart	Director of Fifth Technical District, Telegraph Department	Do.
Mr. P. Dubois	Principal Engineer, Fifth Technical District, Telegraph Department	Do.
Mr. R. Corteil	Chief Engineer, Wireless Technical Service	Do.
Mr. Van Heemstée	Assistant Engineer, Wireless Technical Service	Do.
Mr. C. Caenepenne	Assistant Engineer, Wireless Technical Service	Do.

ORGANISATION.

In 1901, when wireless was still in its infancy, trials were made between La Panne and a Belgian mail boat, to which trials, Mr. A. Roosen, Director-General of Telegraphs; Mr. Pierard, Director-General of Marine; and Mr. E. Pierard, Director of the Telegraph Administration, devoted all their attention, and contributed to the application and development of wireless in Belgium.

The results obtained having been adjudged sufficiently satisfactory for the establishment of wireless between the mail boats and the Belgian coast, provision was made in 1902 for the installation of a coast station at Nieuport



(Bains), and of ten stations on the mail boats, for the purpose of increasing the security of navigation of these ships. This was the first public wireless service inaugurated on any ship afloat.

As progress was made in the domain of wireless, experiments were undertaken to establish the value of improved methods and new apparatus. These trials led in 1909 to plans for completely reorganising the original installations. Subsequently, modifications were introduced at Nieuport (Bain) and to the mail boat installations.

The application of wireless in Belgium is perforce limited, on account of the small extent of territory affected, the necessity of avoiding interference with the stations in neighbouring countries, and the network of existing telegraph lines and other apparatus for speedy communication.

A temporary station is in operation at the waterworks at Ostend, until the new Ostend station is ready, and is fitted with a 5 kw. Marconi musical spark installation, as well as with a 1 kw. C.G.R. installation.

Another station is in operation at the Pilot House at Antwerp, fitted with a 1 kw. S.F.R. installation. This station will shortly be provided with a 10 kw. musical spark set. A private coast station for the Pilot Service is in contemplation.

Provision is being made for the installation of radiogoniometric stations on the Belgian coast.

The new steam pilot boats will be equipped with wireless telegraphy also lightships and Government tugs. The North Sea survey ship, *Ville d'Anvers* already has a wireless installation in operation.

An intercontinental station is projected in Western Belgium, and tenders have been invited. An European station is also to be established.

ADMINISTRATION.

The administration of Wireless Telegraphy in Belgium is regulated by a Law and Royal Decrees, which are reprinted below :—

- A—Law of July 10th, 1908, regulating the use of wireless telegraphy and telephony.
- B—Royal Decree of October 19th, 1908, regulating the application of charges on wireless messages.
- C—Royal Decree of November 3rd, 1913, regulating the conditions of installation and the working of wireless stations.
- D—Decree regulating ships' licences, September 10th, 1918.
- E—Technical and administrative regulations relating to ship stations, October 15th, 1918.*
- F—Circular No. 1 of October 18th, 1918, addressed to shipowners.
- G—Decree regarding Amateur Wireless Installations.

A 1. LAW OF JULY 10TH, 1908, RELATING TO TELEGRAPHY AND TELEPHONY BY ETHER TRANSMISSION.

ART. 1.—The Government is authorised to undertake the establishment and transmission of wireless telegraphy and telephony by ether waves.

ART. 2.—On Belgian territory or on board of a Belgian steamer or vessel no one is allowed without authorisation previously obtained from the Government to erect, establish or cause to be erected or work apparatus for radio transmission capable of carrying out or prejudicing communications.

Each infraction of the clauses of the provisions of the present Article involves liability to a fine varying from 200 to 2,000 francs,

* The Regulations of October 15th, 1918, are specially adapted for wartime, and will soon be modified to suit peace conditions.

together with imprisonment varying from eight days to a year, or either of these penalties alternatively. Such infringement will carry the additional penalty of confiscation for the benefit of the State of the apparatus and all other objects specially designed for their working. Moreover, the Law Officers shall be able to order suspension in the carrying out of the confiscation of all apparatus and other objects or of a part thereof by placing them in temporary sequestration for a term which may be fixed by the tribunal. This sequestration shall be raised if the interested party or his legal representative shall obtain authorisation to make use of the apparatus. In default of such authorisation, the confiscation of his effects shall take place immediately on the expiry of the term fixed under the judgment, unless the competent Minister shall authorise the delinquent either to destroy the apparatus or to transfer its possession to a duly authorised concessionaire.

The preceding arrangements shall apply even

in case of acquittal of the accused, when it has been established that the apparatus and other objects giving rise to the prosecution come under the category covered by the two first paragraphs of the present Article.

ART. 3.—The Government shall fix the rates, as well as the rules of administration and order relative to radiotelegraphy and telephony. Infringement shall be punished in accordance with the penalties established by the law of March 6th, 1908.

ART. 4.—The authorisations referred to in Art. 2 are granted by the Minister exercising jurisdiction over the telegraphic and telephonic services in agreement with the other ministers affected. They shall specifically enumerate their duration, the conditions of installation, use of apparatus, charges where such are made, royalties payable to the public treasury, penalties for infringement and all other limiting conditions, dictated by the interests of public order, as well as by the security and defence of the realm. In the event of infringement of the conditions of authorisation, the latter may be withdrawn by the Minister who granted it. Nevertheless, no royalty can be claimed when it has been proved to the satisfaction of the Minister in Charge of the granting of authorisations that the applicant has no other object than that of experimenting with or making use of the apparatus for his private purpose without making any charge whatsoever.

ART. 5.—No one can establish or work on board a foreign ship or vessel apparatus for radio transmission which can carry out or prejudice radiotelegraphic or radiotelephonic communication, so long as the ship, or vessel, is located in Belgian Territorial Waters, if its action be not in accord with the prescribed regulations set out in Art. 3. The competent Minister may at any time forbid the use of apparatus, or lay down with regard thereto such measures of precaution, supervision and control as he judges necessary.

All infringements of the regulations of the present Article are liable to a fine of 100 to 500 francs. The Law Officers may order the sequestration of apparatus, and of all other objects specifically adapted to their working, for the duration of the stay of the aforesaid vessel in Belgian waters. Such sequestration may be annulled if the interested party obtain from the competent Minister an authorisation to make use of the apparatus in question.

If, after the annulment of the sequestration, the interested party commits a fresh infraction of the conditions laid down, the fine may be doubled and the apparatus and other objects confiscated for the benefit of the State.

ART. 6.—If for any cause, either by reason of public order or the security and defence of the realm, the Government shall judge necessary to suspend the whole, or part of the service, the concessionaire shall be obliged to obey the first instructions given him to that end.

In the same circumstances the competent Minister may either order the apparatus to be put out of action or sequestered, or he may put the apparatus in the hands of his own agents instead of those of the concessionaires. These measures shall be taken for the duration of the period judged necessary by the Government and shall give rise to no claim for indemnification at the hands of the State.

ART. 7.—The penal laws relative to wireless telegraphy and telephony are applicable to

governmental radiotelegraphy and telephony, as well as to such installations and services as have been duly authorised for public communication.

ART. 8.—The Government may designate the functionaries who shall be sworn in as officers of judiciary police for the investigation of the infringer relative to wireless telegraphy and telephony. The official reports drawn up by these functionaries shall be considered correct until they are proved otherwise.

The above-mentioned functionaries shall take precedence, so far as infringements relative to wireless telegraphy and telephony are concerned, over all other officers of judiciary police, with the exception of the Public Prosecutor and the Police Magistrate.

ART. 9.—When there are found to be sufficient traces of the existence of wireless telegraph or telephone installations not regularly authorised or employed, the police magistrates shall visit the localities in which the aforesaid installations shall be presumed to exist, in order to make all necessary investigations into the truth of the allegations, even although it may be necessary to secure access to private property for that purpose.

He may take with himself one or more experts or functionaries sworn in in accordance with the terms of the preceding Article.

He may either effect himself or cause to be effected, by any and all of the officers of the judiciary police, seizure or dismantlement or temporary sequestration of the apparatus set up or employed without regular authorisation, as well as that of all other objects subject to confiscation in accordance with the terms of Arts. 2 and 5 heretofore set out.

ART. 10.—The State undertakes no responsibility for the service of communication by radiotelegraphic or radiotelephonic means.

ART. 11.—The present law shall come into operation the day after its publication.

B 2.—ROYAL DECREE OF THE 19TH OCTOBER, 1908, RELATING TO CHARGES FOR RADIO-TELEGRAMS.

Royal Decree authorising the Minister of Railways, Posts and Telegraphs to settle the amount of charges fixed when necessary in the authorisation for delivery by application of Articles II and IV of the Law of the 10th July, 1908, relating to wireless telegraphy and telephony by ether transmission.

In view of the Law of the 10th July, 1908, relating to wireless telegraphy and telephony:

In view of the International Radiotelegraphic Convention concluded at Berlin in 1906 and the further Acts which complete it:

and
Inasmuch as it is desirable to simplify—so far as charges are concerned—the formalities which appertain to the delivery of Acts authorising the establishment and working of ether transmission, at the suggestion of our Minister of Railways we hereby agree:

Sole Article.—Within the limits fixed by the International Convention relating to Radiotelegraphy and Telephony, our Minister of Railways, Posts and Telegraphs is hereby authorised to settle the amount of charges, when such arise, in the authorisations which he is empowered to issue under the authority of Articles II and III of the Law of the 10th July, 1908.

Given at Laeken, the 29th October, 1908.

(Sgd.) LEOPOLD.

C 3.—ROYAL DECREE OF THE 3RD NOVEMBER, 1913, RELATING TO THE CONDITIONS UNDER WHICH WIRELESS TELEGRAPHY SHALL BE INSTALLED AND WORKED.

In view of Art. III of the Law of 10th July, 1908, which authorises the Government to settle the rules of administration and police relative to radiotelegraphy and telephony:

In view of the Law of 6th March, 1908, relating to the penalties incurred by contravention of general measures of interior administration, as well as to the penalties which may be inflicted under the rules laid down by provincial and communal authorities:

and

In view of the proposal of our Minister of Marine, Posts and Telegraphs, we have settled and hereby decree:

ART. 1.—On Belgian territory and on board ships or vessels of Belgian nationality, every and each proposal for the installation of apparatus for ether transmission, capable of assisting or prejudicing the transmission or reception of radiotelegraphic or radiotelephonic signals, as well as all proposals for modification in their employment, and also every and each proposal for the erection or modification of an installation which has already been duly authorised, ought to be submitted to the Department of Marine, Posts and Telegraphs as a preliminary to their starting operations.

Any request for authorisation must indicate the character of the installation, the object of its use, so far as concerns wireless stations on board ship, tariff of charges proposed, detailed list of the apparatus and of the methods of working, wavelengths, hours of watch, and generally all information of a character such as will facilitate detailed examination of the scheme. There shall be moreover thereon set forth the steps it is proposed to take to prevent interference with the service of other official or authorised stations.

ART. 2.—Such authorisations are issued subject to the reservations and conditions which may be judged necessary in the interests of the convenience and defence of the realm, including the safeguarding of public and service messages.

ART. 3.—A new authorisation becomes necessary:

1. If the station has not been installed or modified and put in working order within the period fixed by the Decree of Authorisation.

2. If it has been put in working order or made use of under the conditions other than those set out in the Decree of Authorisation.

ART. 4.—Installations not regularly authorised which shall have been set up previous to the coming into force of the present Decree shall not be privileged thereby: their service must be suspended and a request for authorisation applied for under the conditions and forms set out under Article I of the present Decree.

ART. 5.—On entering into Belgian territorial waters foreign ships fitted with wireless installations capable of assisting or prejudicing transmission or reception of radiotelegraphic or radiotelephonic signals shall cease communication with any neighbouring stations other than the nearest State stations. They shall announce their presence to these coastal stations and await authorisation or invitation to communicate either with the aforesaid or some other coastal station.

The preceding arrangements shall not apply to foreign ships and vessels, provided that previous to their entering within Belgian territorial waters they shall have been provided under order of the competent Belgian Minister with his special and regularly accredited permit for communication. They shall not interfere in any way with distress signals or the answers to distress signals emanating from other ships or vessels.

To sum up: Foreign ships and vessels are enjoined from the time of their entering into Belgian territorial waters to cease all working which may prejudice the communications of any radiotelegraphic or radiotelephonic stations whatsoever.

ART. 6.—On Belgian territory and within Belgian territorial waters as well as on board Belgian ships and vessels located in foreign waters, duly appointed delegates of the Government shall have free access at all hours of day and night, in accordance with Article VIII of the Law of 10th July, 1908, to all ships, vessels and steamers on which regularly authorised installations may be working, or for which a communicating permit has been granted. The owners, managers, charterers, commanders, agents, masters, and personnel are enjoined to facilitate by every possible means the duties of verification and control vested in these delegates.

ART. 7.—The owners, managers and charterers are civilly responsible for the payment of fines decreed against their commanders, directors, agents, masters, or personnel. Our Minister of Marine, Posts and Telegraphs is charged with the execution of the present Decree.

ART. 8.—The present Decree shall come into force the day after its publication dated Brussels, 3rd November, 1913.

D 4.—DECREE OF THE 10TH SEPTEMBER, 1918, RELATING TO SHIPS' LICENCES.

Albert, King of the Belgians, to all here present and to come, greeting.

In view of Art. 26 of the Constitution which confers the exercise of legislative power on the Ruling Sovereign, in concert with the Chamber of Representatives and the Senate; and in view of the impossibility of assembling the Legislative Chambers.

Under the advice of our Minister of Railways, Marine, Posts and Telegraphs, and Foreign Affairs, and in conjunction with our Ministers united in Council we have decreed and do decree.

ART. 1.—On and after 15th October, 1918, it is enacted that before starting from either a Belgian port or a port belonging to an allied or neutral nation of Belgium, sea-going vessels engaged, or that may become engaged wholly or partially in commercial transport, must be furnished with a licence issued in the name of the Minister of Railways, Marine, Posts and Telegraphs, by the Director-General of Marine or by his representative.

ART. 2.—Other requests for licences must come from the ship owner or charterer or their agents and must be set out in writing in conformity with the provisions of a model approved by Ministerial decree.

ART. 3.—Every licence shall be issued for one or several voyages or for a limited period. Any licence given for more than a single voyage is always liable to cancellation.

ART. 4.—A licence will be refused whenever the authority entrusted with the investigation of the request shall judge that the vessel may—so far as the itinerary or conditions of shipment are concerned—be utilised in a manner more convenient for national interests than it would be if the voyage were carried out under the arrangements set forth in the application, or when such a voyage as that therein set forth would unduly expose the vessel to the risks of war, which the national interests demand shall be avoided.

ART. 5.—A licence shall be also refused if the authority entrusted with the investigation of the request shall judge that by its general condition, or that if its engines, fittings, means of defence, or composition of personnel, the vessel is insufficiently well-found with regard to safety for the voyage for which the licence is being requested.

ART. 6.—Marine Commissioners, Consuls, and Agents designated for that purpose by the authority entrusted with the consideration for the request for licence, shall have the right of access at all times and in all places on board of Belgian sea-going vessels with the object of investigating whether the aforesaid vessel fulfils the conditions necessary for the granting of a licence or whether the conditions under which the licence may have already been granted are well and duly carried out.

Every owner, charterer, or master is enjoined to give the aforementioned officials every necessary aid in the discharge of their duties.

ART. 7.—The Marine Commissioner in Belgian ports and the Belgian Consul in foreign ports may, without prejudice to Art. 9 of the Decree of the 2nd February, 1916, withdraw the permission to navigate from any vessel not furnished with a licence or which shall navigate in violation of the conditions of the present Decree.

They shall be able to arrest, or have it put under arrest by the local authorities—the ship may even be prohibited from putting to sea.

ART. 8.—In the event of violation of the regulations of the present Decree, the Marine Commissioner or the Council shall draw up a circumstantial indictment, every item of which shall hold good until disproved. A copy of this indictment will be sent within 24 hours to the captain of the ship.

ART. 9.—The captain, shipowner, or charterer, who may at any time have been guilty of an offence against the regulations of the present Decree, shall be liable to imprisonment varying from a week to two years, together with a fine varying from 26 frs. to 2,000 frs., or, alternatively one of these penalties. Confiscation of the ship will be enforced, and if enforcement be not possible, the tribunal shall substitute therefor the payment of a fine equal to the value of the vessel.

If there be any extenuating circumstances, the confiscation of the vessel, or the payment of a sum equal to its value, may be obviated in consideration of a payment of some sum less than its value.

ART. 10.—All the provisions of Section I of the Penal Code apply to the infringement of regulations set out in the present Decree.

ART. 11.—Any individual, Belgian or foreign, who shall commit outside the Royal domains, an offence against the present Decree, can be proceeded against in Belgium. If he does not appear, judgment may be passed in default.

ART. 12.—So far as the present Decree is concerned, by "captain" may be understood

any person who exercises the captain's function on board.

We hereby promulgate the present Decree and order that it shall be sealed with the State Seal and published in the *Moniteur*.

Given at our Headquarters,
10th September, 1918.
Sealed (ALBERT).

REGULATIONS RELATING TO TECHNICAL CONDITIONS, INSTALLATION, UPKEEP, SURVEY AND TRAFFIC OF RADIOTELEGRAPHIC STATIONS ON BOARD BELGIAN VESSELS.*

Dated 15th October, 1918.

ART. 1.

Systems of Radiotelegraphic Apparatus.

The choice of wireless apparatus and arrangements to be employed is left open under the express reservation of parliamentary approval, by the Department of Railways, Marine, Posts and Telegraphs of Belgium, which is entrusted with the supervision and control of Radiotelegraphic Installations on board Belgian ships.

Account will be principally taken of the efficiency of the system from all points of view, including the reliability of machines and apparatus, facilities for supervision, for the upkeep of the station, for the replacement of apparatus or parts which may be damaged.

It is extremely desirable, however, that choice should be made of a system with a musical note. Such a kind of note will be obligatory for vessels plying in tropical zones.

ART. 2.

Construction of Radiotelegraphic Installation (Conditions to be fulfilled).

Installations must fulfil the conditions laid down in the Radiotelegraphic Convention of London, 1912, and the supplements thereto, modified by the present code of Rules and later on by subsequent regulations.

(a) *Principal Transmitting Station.*—Radiotelegraphic installations must be able to transmit by day, from one ship to another of the same class, signals which can be clearly read under normal circumstances and conditions at the minimum distance laid down hereafter.

200 nautical miles (about 1,852 metres) for vessels of 6,000 tons and upward.

100 nautical miles for vessels of 3,000–6,000 tons.

75 nautical miles for vessels of 1,500–3,000 tons.

40 nautical miles for vessels of less than 1,500 tons.

Special conditions with regard to range may be imposed for vessels devoted partly, or wholly, to long distance passenger traffic, or such vessels as ply under special traffic conditions.

With the object of enabling the operator to keep himself effectively in touch with, and to regulate the working of the transmitting station, and the energy radiated therefrom by the antennæ-earth circuits, there shall be supplied an unshunted thermal ammeter, specially adapted for measuring currents of high frequency.

* These Regulations are specially adapted for wartime, and will soon be modified to suit peace conditions.

It must be possible to pass rapidly from a wavelength of 600 metres to that of 300 metres and vice versa.

(b) *Apparatus for Syntonisation and Reception.*—Besides the regulating arrangements relative to the reception of wavelengths of 600 metres or less (see Service Regulation annexed to the London Convention of 1914, Art. 7, Section C), the apparatus must allow for reception, with a margin of insurance against interference of transmissions operated on a wavelength up to 3,000 metres.

Use must be made of sensitive and very stable detectors specially adapted for the reception of musical notes.

The reception apparatus must include at least two detectors.

Arrangements must be made for avoiding any induction due to badly established electric circuits, or to any other cause which may tend to obscure faint signals.

Some suitable arrangement must ensure the silence of receiving telephones during transmission, whether the latter is being made through the main station, or the emergency set.

A suitable and conveniently placed buzzer must be carried for the verification of the satisfactory working of the different circuits of the reception apparatus and of the detectors.

(c) *Emergency Transmitting Gear.*—Every board-ship station, whatever may be the constitution of its principal Transmitting Station, must include an emergency set, in conformity with Art. 11 of the Regulations of Service appended to the International Radiotelegraphic Convention of London, with the object of ensuring the possibility of reception when the current of the ship's generator fails, or some mischance puts the principal station out of action.

This emergency set must of necessity be actuated by an accumulator battery with a sufficient capacity and of at least 24 volts. If, however, the principal transmitting station carries an accumulator battery suitably equipped and located, this battery or a part thereof, may serve as the source of energy of the emergency gear.

The emergency set must have a minimum range of 80 nautical miles for vessels of 6,000 tons and upward; or for those of smaller tonnage, partly or solely engaged in long distance passenger service; of 50 nautical miles for vessels of 1,500–6,000 tons which do not come under the above-mentioned category; of 30 nautical miles for vessels of less than 1,500 tons.

When the emergency set includes an induction coil it must be possible to utilise it: (a) for transmitting by direct excitation (plain aerial); (b) for the emission of syntonised and slightly damped waves obtained by feeding the condenser of the primary oscillating circuit of the principal set from the secondary of this coil.

The above apparatus must allow of a rapid change from one of these methods of transmission to the other.

All arrangements must be made so that the emergency set may be put into action instantaneously.

ART. 3. *Antennæ.*

(a) *General Conditions.*—Antennæ must always be maintained in perfect condition, not only with regard to rigidity but also with regard to electrical resistance.

All the connections of antennæ must be rigidly soldered with the greatest care. Soldering must

be carried out with resin to the exclusion of all liquid which might act on metal.

Every precaution must be taken that no strain be put upon a soldered joint, or upon any part which has been heated.

The same precautions must be taken in the case of a broken connection.

Besides the principal antennæ which is in everyday use, there shall be carried on board a single-strand antenna in reserve as well as a small emergency antenna.

(b) *Principal Antenna.*—This must be of a multiple-stranded type strongly fixed.

This antenna must be furnished with straying guides suitably insulated, with their ends attached to the yards in order to avoid shifting under wind-strain or the motion of the ship.

(c) *Reserve Single Strand Antenna.*—In order to afford a temporary stopgap when the principal antenna has been badly damaged by bad weather and when circumstances render reconstruction impossible for some little while, and with the object of carrying on a makeshift radiotelegraphic service, every vessel must carry a single strand reserve antenna of a convenient shape and size. This antenna shall be stretched on a special support furnished with its own insulator—constructed of an unbreakable and elastic material like rubber or caoutchouced rope—and placed in the wireless cabin ready for the operator's use.

The two masts intended to serve as supports shall be furnished each with a reserve block fixed as high as possible and with a continuous halliard serving exclusively for the haulage of the single strand antenna. These blocks and gear for the spare set must always be maintained in perfect order.

(d) *Emergency Set.*—Experience has shown that the explosion of a torpedo or a mine fairly frequently entails the fall of a mast, and consequently tears down the antennæ at the same time, thus preventing the vessel from sending out wireless calls for aid.

In order to neutralise the consequences of such a mishap every ship must be furnished with a small emergency antenna *totally separate from the masts.*

This antenna must be multiple stranded with the object of ensuring a sufficient sending range. It may be of a prismatic or cylindrical type with four or six strands (of the pattern usually spoken of as "sausage"); it shall be fixed by the aid of blocks, say, on one side to the top of a funnel and on the other to the apex of a small spar attached to the wireless cabin or the wheel house, etc.

This antenna should be given as much extension, both from the point of view of capacity and height, as it is practically possible under the circumstances. In the neighbourhood of a funnel it would not be possible to use for its fixture either blocks, insulators or fastening material which might be affected by heat or steam such as ropes, ebonite, rubber, etc.). This emergency antenna must be permanently fixed on the exterior to an insulator with a special lead-in of a type similar to the insulator of the main antenna. Every care must be taken to ensure the practicability of its being instantly connected with the apparatus for transmission and reception in the interior of the cabin.

(e) *Mast Stays.*—The metal stays of masts and other gear, arranged more or less parallel and at a short distance from the strands of the antennæ, must be effectively broken by insulators of high mechanical strength in such a way as to avoid any appreciable absorption of energy.

(f) *Tension of Antenna Stays*.—Care should be taken against stretching the stays too tightly so as to avoid antennæ being torn away in consequence of severe vibrations of the mast-head caused by explosion, collision, etc.

ART. 4.

Electric Generating Group.

Every electric generating group must be constructed and arranged so as to maintain continuous service.

(a) *Ship's Regular Generators*.—If there be machinery on board for lighting the ship, etc., it can equally well serve for supplying energy to the wireless station, provided that when all the apparatus for which it is normally employed is being served there remains an ample supply of electric power for working the radiotelegraphic installation.

(b) *Special System*.—For this purpose it is necessary to choose a very rigid system of construction which is not liable to derangement by powerful shocks and which can be quickly connected up. No systems of electro generation shall be allowed which do not possess a minimum power of $2\frac{1}{2}$ kw. with compound excitation on the dynamo, machines of less power not being of the requisite robust qualities. A power of $2\frac{1}{2}$ kw. must be exclusively reserved to the wireless station and contingently to the lighting of the wireless cabin. In the interests of the safety of the ship the electric generating group must be placed as far as possible in the upper part of the machinery room, or, if it consists of an internal combustion motor, in the immediate neighbourhood of the wireless telegraph station, but so situated that working does not interfere with the operator.

(c) *Working*.—The electric generating system shall work continuously throughout the voyage and the current must be always at the disposal of the operator.

In every gang of engineers one of them must be specially told off to conduct and maintain the electric generating system, and this duty must not in any case fall upon the operators.

(d) *Voltmeter*.—The switchboard belonging to the electric generating system must include an absolutely reliable voltmeter and ammeter.

ART. 5.

Location of the Wireless Telegraph Station—Cabin.

(a) *Location*.—The wireless station must be installed whenever possible on the upper bridge, not too much towards the stern of the ship because the revolutions of the screw produce vibrations which hinder the reception of feeble signals. As far as possible a location shall be chosen free of smoke-stacks, chains, metallic fittings and, as far as possible, out of reach of the waves.

(b) *Cabin*.—This must be solid and well built, perfectly watertight and of a sufficient size to comfortably contain the apparatus, and to serve in case of need as quarters for the operators, besides being sufficiently sound-proof to allow of the reception of faint signals.

The motor alternator system of the sending station must be enclosed in a cupboard sufficiently sound-proof to prevent the noise made by its revolutions interfering with reception; the latter ought to be possible without involving any stoppage of the generating machine.

It is advisable to quarter the operating staff in the wireless cabin. This arrangement allows

of the most rapid action in the case of mishap and consequently affords greater security.

If circumstances do not permit operators to have their bunks made up in the wireless cabin, choice shall be made for their location in a position as near as possible to the wireless station and on one of the upper decks.

The cabin must be fitted with an emergency lighting system independent of the ship's electric generating set, petrol lamps, candles, etc. The operator must always have ready to hand means for getting a light. A ship's lantern must be at the disposal of the operator in the wireless cabin, so that in case of need he may proceed during the night to overhaul the exterior apparatus.

Arrangements should be made that no light can, during the night, filter through to the outside, when the doors of the wireless cabin are opened. (Thick black curtains should be used or automatic light stoppers, operating as soon as the doors are opened.)

The wireless cabin shall be fitted with a ship's chronometer which must always show Greenwich mean time. (G.M.T.)

Easy and rapid access to the roof of the wireless cabin must be provided by an iron ladder so as to enable ready verification of antennæ connections, lead-in insulators, etc.

It has been observed that submarines when bombarding a vessel generally endeavour to destroy the wireless cabin at the first opportunity. These cabins are conspicuous on account of the outline formed by the insulators leading down from the antenna. It will be found an excellent precaution to hide these insulators by (e.g.) awnings which follow the contour of the cabin and overlap its roof.

(c) *Means of Communication*.—The operator must not leave the wireless cabin and abandon his listening-in, in order to receive a communication from the officer on watch, or in order to hand to him a message which he has received, or to ask for current, etc.

It is equally necessary that a third party shall not intervene in the transmission of these messages, such a course being always liable to lead to dangerous errors.

A telephone or speaking tube must therefore be erected between the wireless cabin and the bridge.

If the operators have their bunks fitted in a place apart from the wireless cabin, an electric bell shall be installed in their state room with a push in the wireless cabin, so as to give the radiotelegraphist on duty an opportunity of summoning his colleague.

If there be only a single operator, and if he sleeps in a separate cabin, an electric bell shall be installed in that cabin with a push on the bridge, so as to give the officer on watch means for calling the operator when the latter is not on duty.

All these means of communication must invariably be kept in perfect working order.

ART. 6.

Technical Conditions of Installation.

(a) *Erection and Fitting*.—The rapid execution of erection under present conditions must not interfere with the elementary precautions of assuring the efficient working of the wireless station and providing against risks of short-circuiting and fire.

The connections must also be carefully made by means of a flexible cable insulated by two layers of vulcanised rubber, the whole covered with lead, with an insulation resistance of at least 600 megohms per kilometre. This cable shall moreover be mechanically protected by

a tube of iron or steel in every part where it is exposed to deteriorating influences.

A special line leading from the switchboard of the electric generating group shall furnish power to the wireless station. No other circuit must be connected up with this line except, in cases of emergency, a lighting circuit for the wireless cabin. Fuses must in this case be inserted in order to protect the lamp or lamps. A bi-polar interrupter and contact-breaker must be placed :

(a) In the machine-room, on the switch board of the electric system in the special circuit serving the wireless station.

(b) Within the wireless station itself in the circuit carrying the continuous current.

(c) Within the wireless cabin in the alternating current circuit at the ends of the alternator.

In the case of the two contact-breakers placed in the continuous feed circuit, the one on the switchboard of the electric generating system, and the other in the wireless cabin, the former must be considerably stronger than the latter in order to avoid its replacement with fusible material when faulty manipulation (or some accident to the wireless instruments) results in the melting of the fuses in the wireless cabin.

The switchboard of the wireless station shall be fitted with the necessary measuring instruments for observing the working of the machines and the wireless apparatus.

Nevertheless, it is permissible to replace continuous and alternating current voltmeters on this switchboard by pilot lamps of appropriate voltage.

The continuous current voltmeter—or the pilot lamp which takes its place—must give the operator constant opportunity for assuring himself that the generator is in working order and that there is no interruption in the circuit which feeds the wireless station.

(b) *Machines—Low Frequency Circuit.*—These machines and this apparatus must be very carefully insulated between the windings and between the windings and the frame. They must be submitted to a test for dielectric strength under a continuous voltage of 1,000 volts applied for five minutes when cold.

(c) *High Tension Apparatus.*—The insulation must have and must preserve a high degree of efficiency. This apparatus must be able to stand the following test: The sending station must be operated with the antenna circuit disconnected, and with each terminal of the secondary of the transformer earthed in turn for a period of five minutes, together with its core and metallic casing. Both machines and instruments must be effectively protected against any excess of strain due to the high frequency circuits.

(d) *Accumulator Batteries.*—It is strictly forbidden to switch any circuit whatsoever—lighting, ventilating, etc., on to the accumulator batteries of the principal set, or on to the battery of the emergency set, or to transfer any units of the battery elsewhere; these must never be used, for instance, for lighting purposes during a temporary stoppage, etc.

The only allowable exception consists of the connecting on to the battery of the principal set—if such a source of supply be utilised for that set—a pilot lamp of 20 watts at the maximum which takes the place of a voltmeter. Any such lamp must be protected by a special double-pole fuse.

No pilot lamp may under any circumstances be fitted on the battery of the emergency set.

Operators are held personally responsible for any misuse of their batteries.

The batteries of accumulators must always be kept completely charged during the voyage. This complete charging must be effected before departure, and if necessity arises they must be re-charged every day, or every other day according to the amount of use that has been made of them.

The accumulator switchboard must include :

(a) An ammeter showing the strength of the charging and discharging currents.

(b) A well-calibrated voltmeter connected to the terminals of the battery.

So far as the battery of the emergency set is concerned it is always permissible to omit the ammeter when the charging current is automatically limited to one or two values determined by the introduction of fixed resistances in the circuit.

Since the battery of the emergency set is very seldom at work care must be taken to ensure its maintenance in good order.

For this purpose a special apparatus must be provided for discharging the battery through a resistance.

This discharge shall be carried out at Ports of Call, and care must be taken immediately afterwards to re-charge the battery completely.

Steps shall be taken to make sure of the preservation in good order of the batteries during the periods when the ship's dynamo has stopped working.

(e) *Syntonsisation.*—Regulations against sending out signals in the larger number of allied ports and in certain neutral ports plainly renders difficult a proper tuning up of the ship's station after installation.

Nevertheless, it is easy to effect an approximate syntonsation without infringing the above-mentioned regulations by simply exciting the aerial with the help of a suitable buzzer. It is, therefore, formally recommended that this buzzer tuning method shall be used after installation, preparatory to the operation being completed after the ship has left the port. The operator will be guided in these tests by the reading of his antenna ammeter.

This syntonsation must be made for each of the two regular wavelengths (300 and 600 metres) and for each of the three antennæ, the regular, the single strand, and the emergency.

Tables clearly indicating the different tuning adjustments must be posted up in the cabin in clear view of the operator.

(f) *Plans of the Connections—Working Arrangements.*—Amongst the documents carried by the station, there must be included detailed plans of the connections of the installations and of all the apparatus, with the object of helping operators in looking for and rectifying any faults that may occur.

Radiotelegraphists must thoroughly understand the working of their station. They must practice themselves in establishing instantly, and without experimentalisation the necessary connections for bringing into action the emergency set, the emergency aerial, different wavelengths, etc.

ART. 7.

Operating Personnel.

(a) *Nationality.*—The Belgian Government established on the 4th May, 1917, the following regulations concerning the nationality of the operating staff:—

(1) The radiotelegraphic stations of Belgian ships must be served, in principle, by operators of Belgian nationality.

(2) In default of Belgian operators the owners of stations may, at their own responsibility, and with the previous authorisation of the Belgian Government, have recourse to subjects of Allied nationality to the exclusion of neutral subjects, until they have been able, with as little delay as possible, to replace them by Belgian subjects.

(3) It is only quite exceptional that a neutral operator may, under any circumstances, be allowed to fill a post on board. A specific request must be made in advance, if need be by telegram, and the owner of the station must furnish detailed references. He will be held responsible for any acts that may be committed by this employé.

In any case, any such authorisation will be valid solely for a single trip.

Demands for emergency authorisation must, if need arise, be addressed to: The Administrator of Belgian State Telegraphs, Radiotelegraphic Service, 15, Place de l'Hôtel-de-Ville, Le Havre, France. The telegraphic address of which is: Service Radiotelegraphique Etat Belge, Le Havre.

(b) *Qualification.*—Every operator, whatever may be his nationality, in service on board Belgian ships must possess the Belgian Radiotelegraphic operating licence of the first class, and have a good working knowledge of English.

(c) *Physical Qualifications.*—The special character of the service in times of war constitutes a complete bar against the employment of any operator not completely robust, or in full possession of all his limbs, or in fine anyone who is not physically perfect.

(d) *Disciplinary Measures.*—If an operator gives cause for any reasonable complaint on the part of the Belgian, or Allied Authorities, on the part of the owner of the ship, of the captain, of the owner of the station, etc., with regard to any misdemeanours committed in the course of the execution of his service, he may be disqualified, either temporarily or for the duration of the war, his licence being suspended for the period of his disqualification. A notice thereof will be sent to the Minister of the Interior if the individual so affected proceeds to appeal. If he has been suspended without pay from his functions as Radiotelegraphist on board Belgian ships he will immediately be placed at the disposal of the military authorities.

Operators are, moreover, subject to the Disciplinary and Penal Code of the Mercantile Marine.

ART. 8. *Organisation of the Service.*

(a) *Listening-in.*—During the whole length of the voyage listening-in must be completely continuous. This can only be assured by relays of two operators in watches of four hours on and four hours off. The operator on watch may not even temporarily quit his post in case of urgent need without having been replaced by his colleague not on duty. Nevertheless, if the supply of qualified operators belonging to Belgian, or Allied nations shall be temporarily insufficient, the owner of the ship may be exceptionally authorised to have the service carried on by a single operator. This latter must in that case so organise his listening-in as to receive all the war warnings which may affect the navigation of the ship, as well as radiotelegraphic time-signals at least once in the 24 hours.

Such an authorisation as this must be applied for to the Department of Railways, Marine, Posts and Telegraphs. The person so applying

must state the probable period which will elapse before he can recruit or train a second operator.

(b) *Carrying out of the Service.*—For the carrying out of the Radiotelegraphic Service operators are placed under the supreme authority of the commander of the vessel.

They are strictly forbidden to send out signals of any sort, or to answer a signal, even one of distress, without the authorisation or instructions of the officer on watch. They must never answer any station utilising the Telefunken system. No Allied vessel possesses a set of this type.

All transmission—obviously cases of distress excepted—must be made with the smallest amount of power compatible with the circumstances, so as to reduce as far as possible the zone in which the signals may be picked up by enemy sets, thus enabling them to determine the position of the ship.

All executive messages relating to navigation, as well as all distress signals, must be brought with all speed to the knowledge of the officer on watch *exactly as they stand*; the operator must never undertake to judge whether a message of this kind does, or does not, affect the navigation of his ship, the commander alone is the arbiter in such a matter.

Itinerary.—The operator on watch must make himself acquainted with the itinerary, the position and the course of the ship.

(c) *Duty in case of Distress.*—In the case of accident, explosion, etc., the operator, or operators, must immediately test their instruments to see if they are still in good working order. If the current of the ship's generator has failed they must switch on, without loss of time, the connections of the emergency set and test their antennæ. If the principal antenna be out of order, and if time presses, they must link up their gear with the emergency antenna, taking care to free it, whenever necessary, from all metal contact which may earth it, or from the principal antenna.

A trial with the auxiliary coil with direct excitation (plain aerial) will immediately inform the operator with regard to the quality and insulation of the antenna.

In a word, he must act in accordance with circumstances, so as to be able to send out his signal with the smallest possible delay; the gain of a few seconds may save the lives of all the passengers. It is only if the captain considers that sufficient time is available, and if the emergency antenna be not in sufficiently good order, that the operator may proceed to repair the principal antenna, switch on the single strand antenna, or even erect a make-shift antenna.

As soon as a set is ready to send, he must advise the captain and ask for orders, getting them *confirmed in writing*, and these orders must be followed exactly.

It is the paramount duty of the radiotelegraphist not to abandon his post so long as there is any possibility of sending or receiving; unless the commander has given him the order to do so in view of the imminent abandonment of the ship.

(d) At sea the operator must be ready at any moment to send out signals of distress with the smallest possible delay and with the maximum of energy and efficiency that the circumstances permit; he will make his arrangements accordingly. Thus for instance in the event of damage being done to the aboard-ship generator or to the principal set the emergency gear must be put into working operation.

No distress call may be radiated without the express order of the commander of the ship. It is absolutely necessary that the operator should remain collected at the critical moment of action, mishap or an attack. Upon him may depend the lives of all the passengers to say nothing of his own as well as the preservation of the ship and its freight.

He must never lose sight of the fact that it is useless to send out a distress signal without its being accompanied by the name of the ship in full and as exact an indication as possible of its position. The form of the distress call must follow strictly the instructions of the Naval Authorities in charge of all commercial ships.

Every positional error or change of position must also be radiated.

If an operator receives no answer to his distress calls he must repeat them with intervals of listening-in, and on each emission must recapitulate all the needful particulars. Should the operator conclude that his appeals are vain he should send out a new series of calls after having proceeded in the following manner. Considerably amplify the coupling between the primary oscillation circuit and that of the antenna so as to obtain an impure badly tuned and more damped emission, which stands the chance of affecting the reception of a larger number of stations and consequently of being picked up. It must be remembered, however, that the range of such an emission is less than that of a properly syntonised call. Recourse may also be had on occasions to the emergency gear with induction coil acting on a plain aerial.

Ship's Register.

(c) On every ship the operators should keep a register with numbered pages in which they will progressively enter the following particulars—showing the time in G.M.T. and the name of the operator on watch:—

(1) The start and finish of the watch of each operator as well as any interruptions, their duration and their cause.

(2) Any faults which may occur in the transmitting or reception gear, any lack of current, etc.

The nature and the cause of these mishaps must figure in the report, as well as the duration of the resulting interruption.

(3) The result of the periodic experiments conducted or some mention of the reason for which they have not been made.

(4) A record of all communications carried on with foreign stations and which did not affect their own ship.

It will suffice to make a simple record which will allow later on of these communications being reconstituted and identified. For example:—

17 h. 53 ABC de XYZ—27 mots code mqzr dpyr....

17 h. 56 XYZ demande repetition depuis bdpr, etc., etc.

(5) The complete text of all messages received regarding the navigation of the ship and communicated to the officer on watch.

(6) All distress calls picked up.

(7) The exact text of every message sent.

(8) If possible and if stations permit, in the case of accidents enter all details relative to the execution of the radiotelegraphic service (distress calls, replies, steps taken for safety, etc.).

An operator is forbidden to enter in the steamship register any translation into plain language of a coded text. His register must,

moreover, be verified and checked every day by the commander of the ship.

This register being by its nature essentially confidential must only be handed over to the Belgian and Allied authorities.

In the event of disaster operators must endeavour to save their ship's register, and if there be any risk of its falling into enemy hands they must throw it into the sea.

Account of Accident.

(f) In the event of its being necessary to abandon ship, or if the operator or operators are able to preserve their steamship register, they must address it to the Administration of Belgian Telegraphs at Havre through the intermediary of a Belgian Consul residing in the neighbourhood of the port at which they are disembarked. This register must not be sent by post. Whether the register has been sent or not, the operator (or operators) must in addition indite with as little delay as possible a report giving, with specific mention of dates and times, every detail relating to the execution of the radiotelegraphic service both before and after the accident (distress calls, life-saving procedure, etc.).

Mention must be made of what has happened to the ship's register, and if circumstances permit this report must be submitted by the operator, or operators, to the captain for his signature and he will make thereon any observations which he thinks fit. This document shall then be addressed by registered post to: l'Administration des Télégraphes belges Ministères belges, Le Havre (France).

Allocation of Operators.

(g) In the interest of the security of navigation it is well to maintain as far as possible the allocation of an operator to a specific ship or at all events to ships which ply under the same conditions, *i.e.*, between the same ports or countries.

Regard may be had for the purpose of this rule to temperaments in certain cases; for instance, it is advisable to consider the necessity of relieving operators navigating in tropic seas after long enforced idleness of a ship, or after illness, accident, leave, etc.

Confidential Character of Wireless Messages.

(h) Every operator must have taken the oath of observing the most absolute secrecy with regard to wireless communication under the penalty of Articles 149 and 150 of the Belgian Penal Code.

The attention of operators is expressly directed to the point that in time of war any detail relating to the radiotelegraphic service is of a character essentially confidential; every indication relative to the manner of framing and transmitting certain messages, to the presence of certain ships, to the routes followed, to convoys and their escorts, to distress calls, to sinking, etc., *in fine* everything which concerns navigation, must remain absolutely secret.

Every indiscretion coming to the ears of the enemy may have the most serious consequences.

The utmost discretion is therefore necessary, and more particularly in neutral countries and in the presence of neutral subjects—including amongst them their wireless men.

ART. 9.

Maintenance and Investigation.

Operators are responsible for the maintenance of radiotelegraphic installations. The

commander of the ship must accord them the help of the personnel on board necessary for the investigation and upkeep of antennæ apparatus, etc.

Every part of the radiotelegraphic installation must be constantly maintained in perfect order, special care being given where such parts are subject to high tension.

Periodic Tests.

(1) Twice a day, morning and evening, a test shall be carried out of the principal transmitting set and of the emergency set in local circuit; that is to say, the antenna being disconnected. This test (signals or continuous sending) shall last for the length of time which the operator judges necessary to make sure that all is in order.

(2) Every unnecessary message is forbidden on the high seas. In order to make certain of the satisfactory working of the station (including radiation and insulation of antennæ) opportunity shall be taken at the moment of starting the voyage for proceeding rapidly and at irregular intervals to the following emission tests.

Choice must be made of a time when the traffic between neighbouring stations is small and care must be taken not to choose the hours when war warnings are being issued. These tests shall be reduced in duration to the minimum. They shall proceed as follows:

(a) With the principal set on the principal antenna send out a call of a few seconds; the deviation of the amperemeter of the antenna will allow an operator to judge immediately if the installation be working well (it is unnecessary to keep up this sending until the needle of the apparatus becomes absolutely motionless). (b) With the coil of the emergency set excite the principal antenna in plain aerial; a long white spark strong and crackling will indicate that the insulation of the antenna is good, the emission of short sending will suffice. (c) Make the same test to verify the insulation of the emergency set.

(3) Make a daily verification of the spare detector.

In case of any parts of a machine or apparatus being found to be out of order take steps to remedy this at once. Never leave it over for later on.

ART. 10.

Spare Material—Gear.

(a) *Spare Material.*—The Radiotelegraphic Station must contain the following material:—

(1) A complete transmitting condenser (primary circuit) of a fixed capacity and ready for service.

(2) An aerial lead-in insulator (or a spare tube).

(3) Antenna wire, insulators and accessories in sufficient quantity for the construction of a new main antenna.

(4) A telephone with double headgear and two leads.

(5) A galvanometer for the testing of circuits.

(6) Various wires and ropes.

(7) Various accessories and spare parts, etc.

(b) *Gear and Tools.*—The operators must have at their disposal an ample supply of tools, especially such as are necessary for soldering antennæ and apparatus; their tool chest must contain *inter alia* a hydrometer for verifying the density of the accumulator electrolyte, and a portable and accurate voltmeter graduated from zero to 3 or 4 volts in order to measure the individual cell voltages.

ART. 11.

Special Arrangements.

On board ships coming under this category absolutely special precautions must be carried out.

The wireless cabin must *de rigueur* be located on the upper deck and built in such a way as to be distinct and airy; the insulation of the antennæ and of the metallic stays must, moreover, receive special attention.

Supplementary precautions may be imposed in accordance with circumstances.

ART. 12.

Various Arrangements.

Modifications to Installations.—Ship installations must not be modified without the previous assent of the Department of Railways, Marine Posts and Telegraphs.

Nevertheless, in case of partial (or total) incapacity for working, a new installation may be temporarily erected, provided that it conforms with the conditions imposed for the authorised station.

A new request for authorisation must be sent in without delay, wherein shall be set forth the necessity for having carried out any modification of the installations approved.

The licensee of a board-ship station (*i.e.*, the holder of an authorisation to instal, or of a sea-going radio licence) is obliged at all times to follow the instructions given by the Department of Railways, Marine, Posts and Telegraphs, in whose control are vested all ships' stations, and to carry out within the specified times all modifications or additions which are judged necessary, not only with regard to installations and apparatus but also with regard to the manning, qualification and service of the operating personnel.

At need, the Department above mentioned shall carry out, or cause to be carried out, at the expense of the owner, all testing, repair, modification, or addition of which the execution is judged necessary to ensure good working of the installations or the safety of the ship, without any responsibility under this heading being incurred by the State.

Lifebells.—The wireless cabin, whether or no it serves as the operators' state room, must contain for each of the radiotelegraphists a lifebelt of an efficient and approved type.

Other life-saving apparatus of the same character shall be at the disposal of operators in the places in which they are located if they do not sleep in the wireless cabin.

These life-saving appliances must be always kept in perfect order.

ART. 13.

Measures of Discipline and Control.—The officials of the Belgian Government duly appointed for that purpose have, at all times of the day or night, not only in Belgian territorial waters, but outside those waters, as well as on board Belgian vessels in foreign ports, free access to the installations of the authorised ship station and free disposal of the documents relating to the service of that station.

The owner (that is to say, the holder of an authorisation for installation or of a radiotelegraphic licence) as well as his representative, employees, charterers, captains, officers, operators, masters and personnel are bound to facilitate by every means the work of supervision and control vested in these officials.

Under its controlling rights, the Department of Railways, Marine, Posts and Telegraphs

may demand that the wireless register of the ship be forwarded to it.

Access to the Wireless Cabin.—Access to the wireless cabin is strictly forbidden to the personnel of the ship, except in such cases where access is necessary for the purposes of duty; and the same interdiction applies to any foreigner with the exception of the authorised naval authorities of Allied Powers.

In the absence of the radio officers, the cabin must be locked up after the windows have been closed on the inside, the key shall be handed to the commander of the ship or, in his absence, to the chief officer.

INFORMATION TO BE FURNISHED IN THE REQUESTS FOR AUTHORISATION APPERTAINING TO RADIOTELEGRAPHIC STATIONS.

ART. 14.

Applications to be sent, under registered cover, to the Minister of Belgian Railways, Marine, Posts and Telegraphs, at Sainte-Adresse, Seine-Inférieure, France.

(a) *Where a Ship is not already furnished with Wireless:*—

Applicant.—Social status, name, Christian names; address in Belgium; present address.

Ship.—Name, method of propulsion (steamer, sailing vessel, motor launch), net tonnage, speed, business, itinerary, whether carrying passengers regularly or occasionally; whether on occasion freighted with volatile and inflammable goods.

System of Apparatus.—What system of apparatus do you purpose installing on board your ship? Name and address of the supplier of the installation and apparatus. Name and address of the exploiter of the station.

Nature of the Installations.—Here give a description of the various parts and arrangements of the proposed installation, with plans or the connections and apparatus.

[N.B.—Descriptions and plans must be of such a character as to indicate whether the proposed installations conform to the prescribed conditions.]

The power available at the terminals of the wireless alternator (voltage and current); frequency of current.

Number of sparks per second.

Minimum range by day of the stations as estimated by the supplier.

Constitution of the emergency set.

Accumulator battery of the emergency set, number of cells, type, voltage, capacity, in ampere-hours.

Does the sending set include a battery of accumulators?

Number of cells, voltage capacity in ampere-hours.

Antenna.—The form and approximate dimensions of the main antenna. How is it proposed to instal the emergency antenna? Where will it be fixed? Its shape and approximate dimensions.

Electric Generating System.—If an electric generating system exists on board, show what kind of motor it carries (steam, petrol, etc.).

Power, voltage, and method of excitation for the dynamo.

The power available for feeding the wireless station.

Where is this electric generating system located?

If it is necessary to instal a special electric generating system:—

Name and address of the firm which supply it.

A description and plan of the system, type of motor (steam, petrol, etc.).

Power, voltage and method of exciting the dynamo.

Erection of the Station.—Where is it planned to instal:—

(a) The wireless cabin (are you constructing a special cabin or are you adapting one already existing)? On what deck? In what place? (Here add a plan and elevation.)

(b) The accumulator battery.

(c) The electric generating system (if a separate system is necessary).

(d) Operators' quarters.

Operating Personnel.—What qualified persons have you available to work your station?

Time for Erection.—How long a period do your suppliers need for the delivery of the material and for installing it on board your vessel?

About what time and in what port will this installation be set up?

The Proposed Signalling Arrangements.—Call letters—normal range in nautical miles. Wireless system and the character of emission. Wavelengths. Nature of services. Hours of service.

Board-ship charges: per word in francs.

Board-ship charges: minimum per radio-telegram in francs.

(b) *Where a vessel is already furnished with a wireless station that requires modification or completion in conformity with the stipulations of the present regulation.*

Applicant.—Social status, name and Christian names; address in Belgium; present address.

Ship.—Name, method of propulsion (whether steamer, sailing boat or motor-launch), net tonnage, speed, nature of traffic, itinerary; whether it regularly or occasionally carries passengers; whether on occasion freighted with volatile and inflammable articles.

System of Apparatus.—What is the system of apparatus installed on board your ship? Name and address of the supplier and of the installer of this apparatus. Name and address of the exploiter of the station.

Nature of the Installations.—Add a description of the various parts and make-up of the existing installation with a plan of its connections and apparatus.

What are the modifications you propose introducing to put it in accord with the conditions of the present regulation?

[N.B.—Descriptions and plans must allow of its being seen whether the installation and proposed modifications are in conformity with the new conditions laid down.]

Power available at the terminals of the alternator (voltage and current); frequency of the current.

Number of sparks per second.

Minimum range by day of the existing station.

Is there an emergency set? What is its constitution?

The accumulator battery of the emergency set, the number of cells, type, voltage, and capacity in ampere-hours.

Does the principal set include an accumulator battery?

Number of cells, type, voltage, and capacity in ampere-hours.

Antenna.—Form and dimensions of the principal antenna.

How is it proposed to instal the emergency antenna?

Where will it be fixed? The form and approximate dimensions thereof.

Electric Generating System.—What sort of motor does it carry (steam, petrol, etc.)?

Power, voltage and method of exciting the dynamo.

What is the power available for feeding the wireless installation?

Is the electric generating set installed to serve solely the wireless station? Or is it to supply the lighting of the ship, electric motor-pumps, ventilators, etc.?

Where is the electric generating system installed? On what deck?

Location of the Station.—Where is it proposed to instal:

(a) The wireless cabin: on what deck? at what point? (Include here diagrams in plan and elevation.)

(b) The accumulator battery of the emergency set, as well as that of the principal transmitting set (if it carries one)?

(c) Operators' quarters?

Operating Staff.—What qualified persons have you at your disposal for working the station?

If you have on board only a single Belgian operator, how soon can you arrange to have the station worked by a second Belgian radiotelegraphist, or provisionally by one of Allied nationality?

Time Occupied by the Modifications.—How long do you estimate your suppliers and workers will take in modifying and completing your installations to accord with the conditions of this new regulation?

About what date and in what port will these modifications probably be carried out?

F APPLICATION OF THE DECREE OF THE 10TH SEPTEMBER, 1918, RELATIVE TO SHIPS' LICENCES,

CIRCULAR NO. I.

The attention of shipowners is directed to the fact that in pursuance of Article V of the Decree of the 10th September, 1918, relating to shipping licences, Belgian vessels of 1,500 tons or over must be fitted with a radiotelegraphic station for the transmission and reception of ether messages through the agency of a competent personnel. The erection of these stations, their constitution, their operation, their supervision, etc., are regulated by international agreements and by Belgian laws and regulations in matters of radiotelegraphy.

With as little delay as possible, and at latest before the 15th November, 1918, every owner of a vessel liable to the above-mentioned obligation must, in conformity with Article I of the Royal Decree of November, 1913, deposit under registered cover, addressed to the Department of Railways, Marine, Posts and Telegraphs of the Belgian State, located at Sainte-Adresse, Seine Inferieure, France, a request for authorisation to instal a radiotelegraphic station.

ONE SEPARATE REQUEST MUST BE MADE FOR EACH VESSEL.

Directions with regard to the particulars necessary to be furnished in such requests for authorisation will be found at the close of the administrative regulations affecting wireless telegraphy, dated 15th October, 1918.

The Department of Railways, Marine, Posts and Telegraphs, having regard to national interests and to the arrangements concerning apparatus and operators, shall settle the order in which vessels shall be fitted with their

radiotelegraphic station and shall assign to each one of them the date at which it shall be completely installed and in a perfect condition for working.

The attention of shipowners is specially directed to the conditions of Articles 1 and 2 of the Royal Decree of the 3rd November, 1919, which will be very strictly enforced. The authorisation for making installations must be obtained before any measure can be taken by the interested parties with the object of initiating the work.

A radiotelegraphic licence shall be granted to the owner of a vessel when the installations have been recognised as conforming to the conditions imposed. This licence will be granted for one or several voyages, or for a certain fixed period. It will be cancelled if it be established at any moment that the installations have not been set up and worked in accordance with the conditions stipulated in the licence or in a later regulation.

The licensee (one who benefits under an authorisation for a wireless installation or of a radiotelegraphic licence) shall be bound at all times to follow the instructions given him by the Department of Railways, Marine, Posts and Telegraphs, and must carry out within the specified period all modifications or additions which are judged necessary, both with regard to installations and apparatus, so far as concerns its material, and the qualification and service of the operating staff.

Whenever needful the above-mentioned Department shall initiate, or shall cause to be initiated, at the cost of the licensee, any verification, repair, modification or addition which may be judged necessary to ensure the satisfactory working of the installations or the security of the ship without involving any responsibility therefore on the part of the State.

Except with special permission previously obtained, board-ship stations must be worked by specialised operators of Belgian nationality. Telegraph Administration.

No. 1665 R.

Dated at Havre, 21st October, 1918.

CIRCULAR LETTER TO SHIPOWNERS WHOSE VESSELS ARE ALREADY FITTED WITH A RADIOTELEGRAPHIC STATION.

GENTLEMEN.—Article V of the Decree of the 10th September, 1918, relating to ships' licences makes the granting of these permits subject to certain conditions affecting the manning and conditioning of the ship.

The Circular No. 1 addressed to shipowners has brought to your notice that, in conformity with Article V above, every Belgian seagoing vessel above 1,500 tons net must be fitted with a radiotelegraphic station in charge of a competent staff.

You will have found annexed to the Circular in question the text of certain arrangements which regulate the erection, working and conduct of the stations.

The Decree shall come into force on the 15th October, 1918. A certain amount of delay will be allowed you for modifying the radiotelegraphic installations already in existence on board Belgian vessels and to complete the engagement of the operating staff in accordance with the stipulations of the Belgian administrative regulations with regard to radiotelegraphy under date of the 15th October, 1918.

On the expiry of these delays all wireless authorisations or licences issued previously will expire and be cancelled.

Kindly forward with as little delay as possible and at latest by the 15th November, 1918, under registered cover, addressed to the Department of Railways, Marine, Posts and Telegraphs, located at Sainte-Adresse, Seine Inférieure, France, a fresh request for authorisation with regard to radiotelegraphy. *A separate request must be made for each ship.*

Directions as to particulars you are required to furnish in your request for authorisation will be found at the close of the Administrative Regulations dated 15th October, 1918.

After examining your request I will let you know the length of time granted you for installing and working your present station under the rules newly imposed.

A fresh radiotelegraphic licence will be granted to the ship as soon as we have verified that these conditions are fulfilled.

In order to guard against mistakes and loss of time, all correspondence relating to radiotelegraphic installations (requests for particulars, personnel, licences, etc.) must be addressed directly to:

Service de Radiotélégraphie de l'Etat Belge
Administration des Télégraphes,
15, Place de l'Hôtel de Ville,
LE HAVRE (France);

and telegrams to:

Service Radiotélégraphique Etat Belge
LE HAVRE (France).

Please acknowledge receipt of this letter.

Your obedient servant,
(Sgd.) Belgian Inspector-General of
Telegraphs for Minister of
Marine, Posts and Telegraphs.

MINISTERIAL DECREE REGARDING AMATEUR WIRELESS INSTALLATIONS.

THE MINISTER OF RAILWAY, MARINE, POSTS
AND TELEGRAPHS.

DECREES:

G The conditions regulating the establishment and the working of receiving wireless stations are fixed in accordance with the following:—

ART. 1.—Requests for authorisation must be addressed to the Director-General of Telegraphs and Telephones at Brussels.

The person making the request must indicate the precise place and functions of the proposed station and must furnish for approval a description of the apparatus.

The applicant must prove if such should be the case that he is of Belgian nationality.

ART. 2.—Authorisation is granted:—

(a) By the Director-General of Telegraphs and Telephones when the applicant be of Belgian nationality.

(b) By the Minister of Railways, Marine, Posts and Telegraphs to whom the request should be transmitted by the Director-General with his advice, if the applicant be a foreign subject.

ART. 3.—The station authorised will be utilised exclusively for reception of time and weather signals; the transmission of any other electrical signal is formally prohibited.

The use of amplifying valves is not allowed. However, the Administration of Telegraphs and Telephones may, in certain particular cases, which must be submitted for approval and after enquiry and examination of the reasons given by the applicant, grant an authorisation to use such apparatus under conditions to be determined by the Administration.

ART. 4.—Under the penalty of immediate withdrawal of the authorisation, the applicant must scrupulously observe, and cause others to

so observe, the secrecy of any information which is not intended for public use.

The contents of radiotelegrams other than meteorological telegrams which will eventually be received by the Postal Authorities, must be neither written nor divulged to anyone outside the officials appointed by the Administration of Telegraphs and Telephones, or of the judicial authority. The withdrawal of the authorisation as a result of a contravention of this Law, will be eventually carried out without prejudice to the applicant of any punishment provided for by Law.

ART. 5.—The applicant is forbidden to receive any payment or remuneration whatsoever for the reception of information by means of the station authorised.

ART. 6.—The Government reserves to itself the right to examine installations authorised. When necessary the applicant will grant to the duly commissioned delegates of the Government free access to the said installations, and will facilitate by every means in his power such examination by the delegates.

ART. 7.—The applicant alone is responsible for all consequences whatsoever, resulting from the present authorisation, not only from the point of view of mistakes which may be made, but also in regard to all matters connected with patent rights or of any other rights of a third party. The responsibility of the State is, and will remain, entirely separate in connection with the present authorisation.

ART. 8.—The applicant is held responsible for notifying the Director-General of Telegraphs and Telephones of all alterations which he proposes to make to his apparatus. This must not be changed without the previously obtained consent of the Administration of Telegraphs and Telephones.

This administration may, however, at any time, and for whatever cause, suspend or revoke the authorisations granted, without the payment of any indemnity whatsoever, or without giving any reason for such suspension or revocation.

This permission neither includes any privilege either for this particular authorisation or for any subsequent authorisation of the same nature.

It is not transferable without the express permission in writing of the Administration of Telegraphs and Telephones.

At the request of the Administration of Telegraphs and Telephones the applicant must immediately place his apparatus out of working order.

ART. 9.—The applicant must hold himself responsible for all expenses and charges whatsoever, occasioned by permission granted to him.

ART. 10.—The applicant will pay a fixed annual fee of 20 francs for every authorised receiving station.

The first payment will be made before obtaining the authorisation; it will cover the remainder of any year from the day of the authorisation to the following December 31st.

Subsequent fees will be paid during the month of January of each year. No refund will be made by the Treasury no matter for what reason the use of the apparatus previously authorised be discontinued.

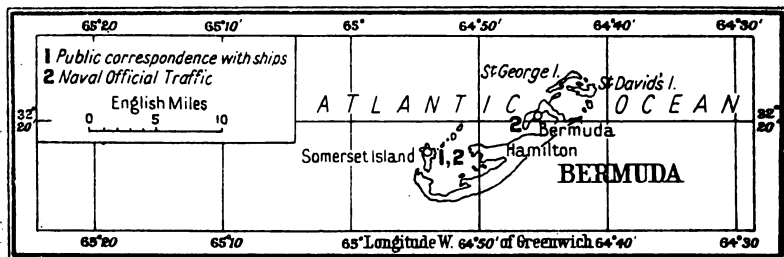
This applies equally in the case of the station being discontinued by order of the Administration of Telegraphs and Telephones.

ART. 11.—Stamp Duties and subsequent Registration Fees will be charged to the applicant.

Done at Brussels, August 7th, 1920.
(Signed) P. POULLET,
The Minister.

BERMUDAS (THE)

A BRITISH Colony with representative Government, consisting of a group of 360 small islands (about 20 inhabited) the Bermudas lie 520 miles east of North Carolina and 677 distant from New York. They are noted for their climate and scenery and constitute a favourite winter resort for Americans. The area is a little under 20 square miles, and the capital city is Hamilton.



ADMINISTRATION.

There are two wireless stations working in the Colony. Wireless telegraphy is administered under the following enactments:—

A—The Wireless Telegraph Act, 1903.

B—The Wireless Telegraph Act, 1909.

THE WIRELESS TELEGRAPH ACT, 1903.

A From and after the passing of this Act it shall not be lawful for any person in these islands to transmit or receive messages across the seas (by an Act of 1910 this was amended by the addition of the words "or between places in these islands") by means of any wireless telegraph, or to install, erect, construct, establish, or maintain in these islands any instrument, apparatus, or other thing for the purpose of transmitting or receiving such messages, unless such person shall hold a written licence from the Governor authorising the same, and such licence shall be in force and unrevoked; and any person who shall offend against the provisions of this enactment shall be liable, on summary conviction before any two justices, for a first offence to a penalty not exceeding £25, and for a second or subsequent offence to a penalty not exceeding £100.

2. Any licence issued by the Governor under this Act may at any time be revoked by him by a written notice given to the person to whom such licence was issued, or by the publication of such revocation in the *Gazette*, and after such revocation such person shall not be entitled to any privilege or protection by virtue of such licence.

3. Any licence under this Act may be issued subject to such conditions and restrictions as the Governor may from time to time consider desirable in the public interest.

4. If any Justice of the Peace shall be satisfied from the information on oath of any credible person that there is good reason to believe that any of the provisions of the first section of this Act have been or are being violated, he may issue a search warrant to any constable or constables authorising and

requiring him or them, with or without assistants, at any hour of the day or night to enter into, and go through and search, inspect and examine any premises where such violation is suspected to have been or to be committed for the purpose of ascertaining whether such violation has been or is being committed; and if, upon such search, any instrument, apparatus, or other thing apparently used, or capable of being used, for the purpose of transmitting or receiving messages across the sea by wireless telegraphy shall be found, it shall be lawful for such constable or constables to seize and carry away, or otherwise to secure the same: and if, upon a hearing before any two Justices of the Peace, they shall adjudge and determine that any such instrument, apparatus, or other thing, has been used, or is capable of being used, for either of the purposes aforesaid, they may adjudge the same to be forfeited, and such forfeiture may be in addition to any penalty which may be imposed on any person under this Act in respect of such instrument, apparatus, or other thing.

5. Any instrument, apparatus, or other thing which shall be adjudged to be forfeited under the provisions of this Act shall be sold or otherwise disposed of in such manner as the Governor shall direct, and if sold the net proceeds of such sale shall be paid into the public treasury, after payment thereof of such reward, if any, as the Governor shall award to the informer, or to any constable or constables executing the search warrant under which such articles were seized.

6. This Act shall continue in force until and throughout the last day of December, 1907. (By the *Wireless Telegraphy Act Continuing Act, 1907*, the Act of 1903 is continued in force indefinitely.)

THE WIRELESS TELEGRAPH ACT,
1909.

B The Governor having informed the Legislature that a despatch has been received from the Secretary of State for the Colonies drawing attention to the desirability of making Regulations as to the use of Wireless Telegraphy apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, it was deemed expedient to confer on the Governor in Council the power to make such Regulations as may be necessary for the purpose aforesaid, and the following Act came into force in March, 1909:—

1. It shall be lawful for the Governor in Council to make regulations as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, for preventing such apparatus being worked so as to interfere with naval signalling, or with the working of any wireless telegraph station lawfully established or worked in these islands, or with the transmission of messages between any such station and ships at sea.

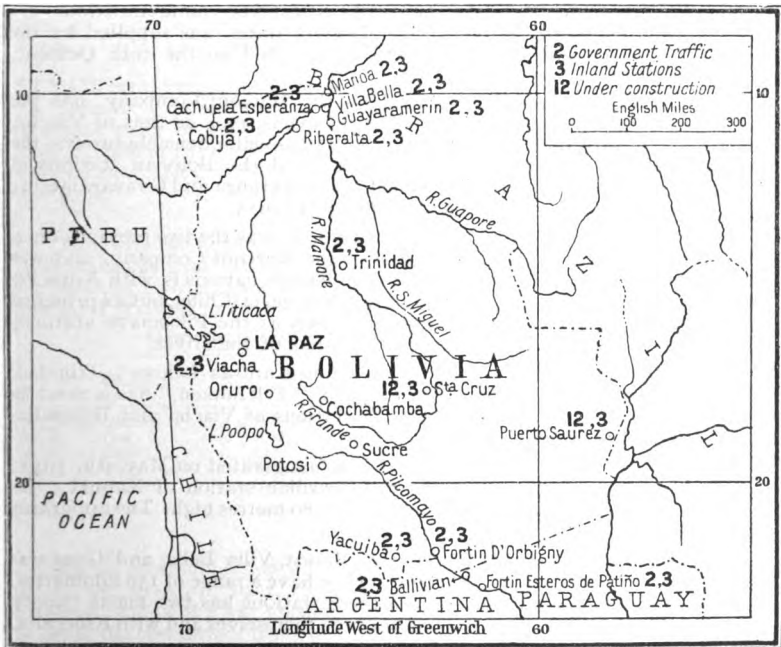
2. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships, whilst in the territorial waters of these islands shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

3. Any regulations made under this Act may impose fines for any breach thereof not exceeding £20 for a single offence, and not exceeding £5 a day for a continuing offence, and such fines shall be recoverable with costs in any Court of Summary Jurisdiction consisting of any two Justices of the Peace.

4. All regulations made under this Act shall become operative on the date of their publication in the *Gazette*, or on such later date as shall be fixed by the regulations or the purpose.

BOLIVIA

THIS State possesses no seaboard, and, therefore, no maritime stations. The total area of the Republic is reckoned at 703,421 square miles. Geographically it lies between latitude 8° and 23° S., its longitude extending from 57° 30' to 73° W. The population is estimated at about two and a half millions. Lake Titicaca, a wonderful stretch of water, about 150 miles in



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length and breadth and 12,545 feet above the level of the sea, marks the boundary between Bolivia and Peru, and still forms an important means of communication between the countries, although the most direct means of transit consists of the railway between Arica (Peru) and La Paz, the capital of Bolivia.

The Government consists of a President, two Vice-Presidents and five Ministers of State.

CONTROL.

Wireless telegraphy forms at present a branch of the Posts and Telegraphs, which is administered by the State.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. Isaac Cariaga Lanza ..	Minister of Government and Public Works	La Paz
Mr. R. Villalobos	Director-General of Posts and Telegraphs	La Paz
Mr. Humberto Asin	Chief of Radiotelegraphic Service	La Paz

ORGANISATION.

Bolivia entered the International Telegraphic Convention on June 1st, 1907, in the fourth category, and gave in its adherence to the International Radiotelegraphic Convention on October 29th, 1915.

At present the following stations are in operation: The station of Viacha, which owing to its proximity to the capital is the first or central station of the Republic. The power is 15 kilowatts, it has four masts of 80 metres each, the working range is 1,200 kilometres during the day, it communicates with the Peruvian stations of Lima and Cachendo, and with the Bolivian stations of Riberalta, Yacuiba, Trinidad, whilst its communications are received at all offices of the Republic. The apparatus was supplied by the Marconi Company, and the service was inaugurated on the 20th October, 1916.

The station of Riberalta, installed by the Marconi Company, has the same power, the same height and number of masts, etc., as that of Viacha, communicating with the Brazilian stations of Porto Velho, Sena Madureira, the Peruvian stations of Yquitos and Cachendo, and the Bolivian stations of Viacha, Cobija, Trinidad, Villa Bella, Cachuela Esperanza and Guayaramerin; the station has been in operation since October, 1915.

The station of Yacuiba, also, is of the same type as the two previous ones. The work was commenced by engineers of the Marconi Company, and was concluded in August, 1915. Its service with foreign nations is with Asuncion (Paraguay), and it also communicates with Antofagasta (Chile), but its principal aim is to communicate with the stations known as the Pilcomayo stations, so named from their being situated on the banks of that river.

The other stations in order of importance are as follows: Trinidad, the power of which is 6 kilowatts, and system "Telefunken," has a mast 80 metres high, and communicates with the stations of Viacha and Riberalta. It was installed in 1919.

Cobija.—The service of this station was inaugurated on May 4th, 1919; it communicates with Riberalta and the Brazilian station of Xapury. Its power is 5 kilowatts, and it is fitted with a mast 80 metres high. The apparatus was supplied by the Marconi Company.

The stations of Cachuela Esperanza, Manoa, Villa Bella and Guayaramerin are of the "Telefunken" system. They have a range of 150 kilometres, their power is 4 kilowatts, and each of these stations has two masts twenty metres in height. They communicate between themselves and with Riberalta, and were opened in January, 1920.

Laws and Regulations—Borneo (British)

The stations called the Pilcomayo stations are installed at the military forts of Ballivian, D'Orbigny and Esteros. That of Ballivian is first which was installed in the Republic, the date being February 21st, 1917. The system of the three stations is the "Telefunken," and their power is (six-tenths of a kilowatt) in the primary, notwithstanding which they communicate perfectly at a distance of 380 kilometres, by day, although in this district there is 90 per cent. of high wood. The height of the masts is 20 metres each, there being two masts to each station.

At each of the 15 kilowatt stations, which intercommunicate, a chief has been appointed who supervises the personnel of the neighbouring stations of lesser power, for which it has been necessary to create three divisions, which have received the names of Northern, Central and Southern Radiotelegraph Zones. Included in the first are the stations of Cobija, V. Bella, Cachuela Esperanza, Manoa and Guayaramerin, the chief of which stations is stationed at Riberalta; to the second zone, viz., the Central zone, belongs only Trinidad, having Viacha as its central station, and finally Yacuibá which is the chief station of the Southern zone, in which are included the stations of Ballivian, Fort D'Orbigny and Esteros. Frequently this last mentioned zone is called the Chaco zone.

A radiotelegraphic school was established during 1917 in La Paz, under the direction of Mr. Asin, the Superintendent of Radiotelegraphy. There are no wireless clubs or societies in the Republic.

ADMINISTRATION.

At present no special laws or regulations have been passed for the administration of wireless, but a Bill for that purpose is in course of being drafted.

BORNEO (BRITISH) **Protectorate of Sarawak**

THIS semi-independent State lies on the north-west coast of the island of Borneo. Its seaboard is 400 miles, its area 50,000 square miles. The romantic story of how the present hereditary dynasty was initiated under Raja Brooke in 1842 is too well known to need repetition. It is now a British Protectorate, the Civil Service being composed of British officials selected by the Raja.

CONTROL.

The wireless department is in the sole charge of the Post Office, the Postmaster-General having been appointed "Manager" in August, 1916, and the stations having been opened for general use in April, 1917. There are four land stations in Sarawak, all directly controlled by the Government.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. J. R. Barnes	Manager	Kuching.
Mr. P. E. Cox	Assistant Engineer	Do.
Mr. C. S. Were	Chief Operator	Do.
Mr. H. G. Gray	Second Operator	Do.
Mr. J. M. Hoover	Sub-Manager, Sibü Station	Sibü.

ORGANISATION.

Radio communication was instituted by the Government for public and official use in April, 1917. The chief station is at Kuching, the capital of Sarawak, and is of 8 kw. normal. Sub-stations are situated at Miri, Sibü, and Sadong, the two former being of $2\frac{1}{2}$ kw., and the latter $\frac{1}{2}$ kw. The "Compagnie Générale de Radiotélégraphie, Paris," system is employed throughout. An

additional station will shortly be erected at Bintulu. All sub-stations communicate direct with Kuching, and the latter with Singapore. All stations are also open for ship communication daily from 0700 to 1700, but special watches for ships will shortly be instituted at the following hours: 0900 to 0920, 1200 to 1220, 2100 to 2120. There is one experimental station belonging to the manager at Kuching; other experimental or amateur stations are allowed, provided the wavelength does not exceed 400 metres.

ADMINISTRATION.

There are no regulations obliging ships trading in Sarawak waters to be fitted with wireless.

British North Borneo

British North Borneo occupies the northern part of the Island of Borneo. The interior is mountainous, Mount Kinabalu being 13,455 feet high, but most of the surface is jungle. Total area 31,106 square miles; coast line 900 miles.

The territory is under the jurisdiction of the British North Borneo Company, being held under grants from the Sultans of Brunei and Sulu (Royal Charter in 1881). The territory is administered by a Governor (appointed with the approval of the Secretary of State) in Borneo and a Court of Directors in London, appointed under the Charter. On May 12th, 1888, the British Government proclaimed a formal protectorate over the State of North Borneo.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPH OPERATORS.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. C. F. Newton Wade, A.M.I.R.E.	Postmaster-General and Superintendent of Telegraphs	Jesselton.
Mr. H. A. Dabell	Assistant Postmaster and Assistant Super- intendent of Telegraphs	Sandakan.

ORGANISATION.

Radiotelegraph intercommunication is maintained by four 5-kilowatt Government stations situated at Jesselton, Sandakan, Kudat and Tawau respectively. The Siemens Quenched Spark system is employed throughout. The Sandakan station was the first erected in the State and completed in October, 1913. The conditions of working are, as in most tropical countries, not altogether good, owing to the strong electrical disturbances and the mountainous country which is covered with dense jungle. The four stations have, however, maintained an uninterrupted day service since their erection.

ADMINISTRATION.

Wireless telegraphy is administered in accordance with the provisions of the following ordinance:—

A—Wireless Telegraphy Proclamation, 1914.

WIRELESS TELEGRAPHY PROCLAMATION, 1914.

A British North Borneo has been included as a party in the International Radiotelegraphic Convention.

The following proclamation controls the use of wireless telegraphy:—

1. This proclamation may be cited as "The Wireless Telegraphy Proclamation, 1914," and shall come into force upon the publication thereof in the *Gazette*.

2. (i.) In this proclamation the expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraph Proclamation, 1901," without the aid of any wire connecting the points from

and at which the messages or other communications are sent and received:

The expression "locally owned ship" means a ship owned wholly by the Government or by bodies corporate established under and subject to the laws of this State, and having their principal place of business within this State.

(ii.) Nothing in this proclamation shall prevent any person from making or using apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station, or the installation or working of any apparatus for



wireless telegraphy, in any place in this State or on board any locally owned ship.

4. (i) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in this State or on board any locally owned ship except under and in accordance with a licence granted in that behalf by the Governor.

(ii.) Every such licence shall be in such form and for such periods as the Governor may determine, and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (i) Any person establishing a wireless telegraphy station without a licence in that behalf, or installing or working any apparatus for wireless telegraphy without a licence in that behalf, shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, provided that no proceedings shall be taken against any person under the proclamation except with the previous sanction of the Governor.

(ii) On being satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, a magistrate may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (i) The Governor may make and, when made, vary or cancel rules more particularly for all or any of the following matters:—

(a) For prescribing the form and manner in which applications for licences under the proclamation are to be made;

(b) For prescribing the fees payable on the grant of any licence;

(c) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, in the waters of this State shall be worked so as to prevent the interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in this State or the waters thereof, and so as not to interrupt or interfere with

the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(d) For prohibiting, except with the special or general permission of the Superintendent of Telegraphs, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, whilst such ship is in any of the harbours of this State;

(e) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether locally owned ships or British or foreign ships, in the waters of this State, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, either in all cases or in such cases as may be deemed desirable;

(f) And generally for the more effectual carrying out of the provisions of this proclamation.

(ii) No rules made in respect of the matters described in paragraphs (c), (d), and (e) of sub-section (i) shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. On an application for a licence proving to the satisfaction of the Governor that the whole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted to such applicant, subject to such special terms, conditions, and restrictions as the Governor may think proper that such licence shall not be subject to any rent or royalty.

8. (i) Every omission or neglect to comply with, and every act done or attempted to be done contrary to, the provisions of the proclamation, or of any rule made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued, shall be deemed to be an offence against, not otherwise specially provided for, the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding five hundred dollars.

(ii) All convictions, forfeitures, and fines under this proclamation, or any rules made thereunder, may be had and recovered before the Court of a Magistrate of the First Class.

BRAZIL

THE great Republic of Brazil extends on both sides of the Equator. With regard to latitude it stretches between 4° 22' N. and 33° 45' S., whilst with regard to longitude it lies within the limit of 34° 40' and 73° 15' W. It covers an area estimated at 3,298,870 square miles, and abounds in natural wealth of every description. Originally a colony of "Britain's oldest ally," the most cordial relationship between Brazilians and British is traditional with both nations.

CONTROL.

The radiotelegraphic stations of the country are exclusively under the control of the Government, and their administration is regulated by the Minister of Public Works with respect to installations of a civil character,

and by the Ministers of State for War and the Navy with respect to installations destined for national defence and the services of the military and naval forces.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. Pires do Rio	Minister of Public Works	Ministerio da Viacao.
Dr. Antonio Nogueira Penido	Director General of Telegraphs	Reparticao Geral dos Telegraphes.
Dr. Francisco Bhering ..	Sub-Director Technical Department ..	Do.
Dr. Ferreira Chaves ..	Minister of Marine	Ministerio da Marinha
Admiral Max de Frontine..	Chief Naval Staff	Do.
Capt. Tenente Mario De- barros Barreto	Chief Naval Radio Service	Do.
Dr. Pandia Calogeras ..	Minister of War	Ministerio da Guerra.

N.B.—The Radiotelegraphic Service of the Army is directed by an officer of the 1st Battalion of Engineers.

By Decree No. 13124 of August 7th, 1918, stations under the Ministry of Public Works were transferred to the Ministry of Marine for War purposes, but it has been arranged for these stations to revert to the Ministry of Public Works.

ORGANISATION.

There are no private, experimental or amateur wireless installations; all have been abolished by order of the Government. There are no wireless societies, clubs or publications. The only company manufacturing *wireless apparatus* in Brazil is Marconi's Wireless Telegraph Company, Limited, Rio de Janeiro, which company also conducts a wireless school. The Telegraph Department have established an official School of Radiotelegraphy. This school will not be open for some time. Dr. Francisco Bhering, Sub-Director of the Telegraph Department and a professor of the Polytechnic Engineering School, has been appointed first Director. One of the salons has been given the name of Marconi, in honour of the great inventor. Another salon bears the name of Morse.

According to the latest information available (December 31st, 1919) the following constitute the number of stations at present working:—

LAND STATIONS.

Coast Stations	28
Stations for Internal Communication only ..	10
(There are no privately owned Land Stations.)	

SHIP STATIONS.

Naval vessels	30
Merchant vessels	119

ADMINISTRATION.

The following laws and regulations govern the administration of wireless in the Republic:—

A—Extract from Act relating to the Brazilian Merchant Service.

B—Extract from Law No. 2,719 of December 31st, 1912.

C—Law 2,738 of January 4th, 1913.

D—Decree 10,689 of January 14th, 1914.

E—Regulation.

F—Form of Licence.

G—Decree No. 3,296 of July 10th, 1917.

H—Extracts from Decree No. 3,316 of August 16th 1917.

I—Project No. 367 of 1919.

It must be noted that "D," although passed by Congress and signed by the President of the Republic, would not appear to have yet come into active operation in its entirety. It will be observed, for instance, that the Decree gives permissive power to the Government to allow Private Corpora-

tions and the Authorities of the States comprising the Republic to erect stations within certain limitations. The later Decree, lettered "G" seems to contemplate the suspension of this power and possibly of some other provisions also.

A ACT RELATING TO THE MERCHANT SERVICE.

The following Articles refer to Wireless Telegraphy:—

ART. 159.—Those boats must without exception be provided with radiotelegraphic apparatus, approved by the General Direction of Telegraphs, with the necessary power to allow of communication with the wireless stations in the zones in which they trade, when:

(a) they carry passengers and are employed in the coastal trade, of any description whatsoever, and have a registered tonnage of over 300 tons, and for those boats employed in river trade having a registered tonnage of over 500 tons.

(b) They are only employed in the coastal trade as cargo boats, but carry over 30 (thirty) souls all told.

ART. 160.—After the promulgation of this regulation, no ship shall be registered by any Port Authority if it has not complied with the regulations of the preceding Article, the licence to navigate being refused to any ship which, within one year from the date of the promulgation of this regulation, shall not have fulfilled the depositions set forth herein.

LAW NO. 2,719.

DECEMBER 31ST, 1912.

B The above Law fixes the Coast Tax at 6 francs for a telegram up to 10 words, and 60 centimes for each extra word. Included in the rate is the transmission between a coast station and the telegraph stations to which the wireless station is directly joined up.

There is a land telegraph charge (via National lines) of 25 centimes a word without minimum on telegrams destined to telegraph stations which are not directly connected up with a coast station.

For telegrams exchanged between Brazilian coast stations and ships flying the Brazilian flag the ship tax has been fixed at 240 reis a word with a minimum of 10 words, the coast tax at 400 reis a word with a minimum of 10 words, and the land telegraph charge (if any) at 200 reis a word without a minimum.

LAW NO. 2,738.

JANUARY 4TH, 1913.

C A new wireless district was created by the above Law, with a credit of 732 contos, to include the Acre, Amazonas, and Para wireless stations, and these stations have since been taken over by the Telegraph Department and opened to public traffic.

DECREE NO. 10,689.

JANUARY 14TH, 1914.

D Approves the regulations governing the national wireless system.

The President of the Republic of the United States of Brazil, using the authority granted to him by Section 1 of Art. 48 of the Constitution, hereby decrees:

Sole Article.—The regulations for the national wireless service revised by the combined Civil and Military Technical Committee issued together with the present decree, signed

by the Ministers of State for the Affairs of Roads and Public Works and for the Affairs of the War and Marine, as hereby approved by virtue of Articles 18 and 19 of Law No. 2,050 of the 31st December, 1908.

Rio de Janeiro, 14th January, 1914, 93rd of Independence and 26th of the Republic.

HERMES R. DA FONSECA

José Barboza Gonçalves.

Alexandrino Faria de Alencar.

Vespasiano Gonçalves de Albuquerque e Silva.

REGULATIONS.

FOR THE NATIONAL WIRELESS TELEGRAPHIC SERVICE REFERRED TO IN DECREE NO. 10,689 OF THIS DATE.

(Revision of 1913.)

CHAPTER I.

E *Wireless telegraphic system and organization of the respective stations.*
WIRELESS TELEGRAPHIC SYSTEM.

ART. 1.—The wireless telegraphic system shall consist of the fixed stations erected on the coast and on the islands and in the interior of the Republic depending upon the Ministries of Roads and Public Works, of Marine and War and of mobile stations existing in ships navigating under the Brazilian flag.

ART. 2.—The fixed stations shall constitute five groups, to wit:

1. International service by land or oversea.
2. Ocean service.
3. River or fluvial service.
4. Frontier or border service.
5. Inter-State service.

Sole Paragraph.—The wireless telegraphic and telephonic service over Brazilian territorial waters is under the exclusive control and supervision of the Federal Government.

ART. 3.—The mobile stations dependent upon the different departments of the administration interested in each shall constitute other groups intended for the purposes of the travelling service in general, and shall be formed according to the requirements of each department.

Sole Paragraph.—Carts, aeroplanes and airships when fitted with wireless telegraphic and telephonic stations shall constitute the object of provisional instructions issued by the Combined Technical Committee in regard to their class.

ART. 4.—The States in the establishment or authorisation of the inter-State service shall have in view the provisions set forth in the Convention of Berlin, 1906, and maintained in the London Convention, 1912, as regards the obligation assumed by the Union that it would impose the fulfilment of the international provisions upon such private enterprises as might be authorised either to establish or to operate coastal wireless telegraphic stations open to the public service between the land and the ships at sea, or authorised to establish and operate wireless telegraphic stations open or not to the public correspondence on board any ships sailing under the flag of the said nations. This provision must therefore be complied with in the three cases of the carrying out of works which are defined by law as being under administration, by contract and by concession.

ART. 5.—The Federal Government reserves for itself, in a general manner, the inter-State service, in accordance with section 4 of Article 9 of the Federal Constitutional Law, and due to the fact that all the States and the Acre Territory are provided, without exception, with Federal telegraph services with or without wires.

Sole Paragraph.—The communication between any points situated on inter-State border zones, whenever they shall not cause any losses whatsoever to the Federal Services, may be authorised by the States interested with the approval of the Union previously granted by means of temporary permission without privilege, provided the development of the national telegraph system be protected.

ART. 6.—The fixed federal stations, besides the ordinary inter-communications, must attend to the mobile stations not only on any craft navigating on the rivers and the ocean, but also to those placed on carts and others intended for the service of the Army and for public works in general.

Sole Paragraph.—Whenever the service of the fixed intra-State stations shall have to reach beyond the border of the States it shall be turned over to the Federal fixed stations specially such messages as may be intended for the fluvial correspondence.

ART. 7.—The fixed and movable stations of the Ministries of War and Marine shall comply, as far as possible, with the same regulations governing the fixed and movable stations depending upon the Ministry of Roads and Public Works and upon the States, as also with the provisions set forth in the International Conventions and Regulations in force.

Sole Paragraph.—The naval stations and those belonging to the Army shall, nevertheless, be always obliged to comply with the provisions of Articles 8 and 9 of the London Convention dated 1912, and that of Berlin dated 1906—i.e., they shall, as far as possible, avoid disturbing the service of the other stations of the same kind, and shall receive with absolute priority the signals of distress.

ART. 8.—It shall be the duty of the stations constituting the national system depending upon the Ministry of Roads and Public Works, the Ministry of War and the Ministry of Marine and upon the States to prefer normally the watch service having in view any disasters on the seas or the rivers and other accidents, in accordance with Art. xxi, as regards preference, and Art. xxxii regarding the hearing during three minutes after every period of 15 minutes of transmission (International Radiotelegraphic Regulations of 1912).

Section 1.—The stations depending upon the Ministry of Roads and Public Works and upon the States are intended for the service of public correspondence in general, between the land and the ships at sea, and the rivers, as also overland or any special services pertaining to public administration.

Section 2.—The Army and Navy stations are intended for the official correspondence, and, without prejudice to such services, for private correspondence of their crews and men (soldiers).

Section 3.—Stations intended for traffic of public messages in general must give preference to the messages from the naval stations and of the Army. Correspondence with the military stations can only be preferred by the service of distress.

ART. 9.—Naval stations although erected for strategical purposes of the defence of the country along the ocean rivers, the borders of navigable rivers or on board ships, and notwithstanding that the fixed stations of the Army shall be intended for the purpose of assisting in the military exercises or in the defence of the nation—they may nevertheless, whenever the Government may deem it convenient, be authorised to take care of the public service in general. In such cases these stations shall during that period be entirely subject to the provisions of the regulations in force.

Sole Paragraph.—The stations on the borders, over and above the strategical use they may have, shall also serve as exchange stations for the international overland service with the bordering republics whenever it may be convenient.

ART. 10.—Out of the total number of stations of the wireless telegraph system a certain number shall be selected to take care of the general hour service in accordance with the International Convention of Paris and with the Regulations for the interior service approved by the Department of Agriculture, Industry and Commerce. (Decree No. 10,546 of the 5th November, 1913.)

Sole Paragraph.—The stations at Noronha, Rio de Janeiro, Trinidad and Juncão (in the State of Rio Grande do Sul) shall transmit message of the hour to the sea and inland as provided by the Conference of Paris, 1912.

ORGANISATION OF THE WIRELESS TELEGRAPH STATIONS.

ART. 11.—The name of fixed coastal station shall be given to all wireless telegraph stations established on firm land or on board ships permanently anchored near the coast or yet on the islands near the coast.

ART. 12.—The name of boat station shall be given to those stations of wireless telegraphy established on board a merchant ship or a man-of-war not permanently anchored.

ART. 13.—The name of fixed station simply shall be given to all and any wireless telegraph stations established on firm land and proposed to handle traffic between fixed points or between the land and ships sailing on the rivers.

Sole Paragraph.—All fixed wireless telegraph stations, coastal or otherwise, shall be connected by wires to the ordinary stations of the General Telegraph Department or to stations of other telegraph lines, provided this connection shall be deemed useful for the service, practically possible and economically convenient.

ART. 14.—The stations in general shall be organised under the following conditions:

1. In accordance with the progress of science and technics by selecting for the purpose as far as possible the most perfect apparatus;

2. By providing them with the necessary material capable of insuring a continuous service inclusively at the boat station by providing them with reserve plants (Art. XI of the International Regulations, 1912);

3. By providing them with the necessary staff capable of insuring a continuous service, the operators to possess certificates of their professional capacity, whether they be employed at the fixed stations or at the stations on board ship (International Regulations, 1912, Art. X; International Regulations, 1906, Art. VI, section 5).

ART. 15.—The stations shall be classified

according to the energy irradiating from their antennæ, rather than according to their reach as main stations and stations of the first, second and third classes.

Section 1.—Main stations are those stations irradiating 25 kilowatts or more of oscillatory energy;

Section 2.—Stations of the first class are those stations irradiating from 10 to 25 kilowatts exclusive;

Section 3.—Stations of the second class are those stations irradiating from 5 to 10 kilowatts exclusive;

Section 4.—Stations of the third class are those stations irradiating from one to five kilowatts exclusive. Stations irradiating less than one kilowatt shall be classed as third-class auxiliary stations.

Art. 16.—The employment of the wave compartments shall be subject to the International Regulations (Arts. II, III, IV, XXXV, section 2) of London; nevertheless for inland service this may be governed by local convenience and traffic.

Section 1.—For the ordinary ocean service (2nd group of stations), intended for the purpose of public messages in general, two wave compartments of 300 metres and of 600 metres shall be admitted; one of these, however, shall be indicated in the International Nomenclature as being the normal law wavelength of the station.

Section 2.—In special cases the stations of the ordinary ocean service shall be allowed to employ a wave of 1,800 metres, in accordance with the provisions of *section 2* of Art. XXXV of the International Regulations.

Section 3.—Wave compartments below 600 metres, those of 300 metres excepted, and compartments of more than 1,600 metres will be admitted for employment for the large ocean service for messages other than public messages in general.

Section 4.—Stations intended for the sole purpose of irradiating signals to determine the position of ships shall employ waves of not more than 150 metres.

Section 5.—Every station on board ship shall be established in such a way that it will be capable of utilising, in transmitting and receiving, waves of 600 metres and of 300 metres, the former being the normal extent of the wave.

Section 6.—Every station on board ship shall be established in such a way that it will be capable of receiving calls transmitted with the normal wave.

Section 7.—Waves of less than 600 metres, those of 300 metres referred to in *section 5* excepted, shall only be admitted for use by ships subject to previous authority of the Government and in special cases.

Section 8.—Ships of light tonnage materially unable to transmit with a 600 metres wave shall be admitted to utilise exclusively the 300 metres wave; they shall nevertheless maintain their plant in a condition at any time to receive messages by means of the normal 600 metres wave.

Section 9.—In the event of difficulty of communication and in order to avoid momentary interference, a regulation length of wave may be employed other than the normal length; the normal length shall, however, be resumed when the momentary difficulties to traffic shall cease.

Section 10.—Naval stations and the stations of the Army shall transmit by means of waves of such length as shall as far as possible avoid

their services interfering with the service of public traffic in general. Such lengths, for instance, as 200 metres, 300 metres, and 1,200 metres approximately.

GENERAL TECHNICAL COMMITTEE.

Art. 17.—The localisation, the establishment, and the traffic of fixed wireless telegraph stations under the control of the Departments of Road and Public Works, of War and of Marine and of the different States shall, in every case, be considered by the Combined Technical Committee in view of their utility in regard to trade, to shipping and to the defence of the national territory, so as to conciliate in the best possible manner the interests of each.

Sole Paragraph.—In grading the power of each station the provisions of Decree No. 10,090 of February 1st, 1913, shall be observed.

Art. 18.—Whenever the civil and military authorities directly interested shall have to make scientific or technical experiments in wireless telegraphy or telephony they shall in the first place notify their intention to the Combined Technical Committee for the purpose of co-ordinating and obtaining the best possible advantage out of the combined efforts of those Departments of which the members of the Committee are the delegates.

Section 1.—With the exception of the Federal and State authorities, no other authorities or private parties shall be allowed to make experiments or to erect and equip for purposes of experiments or for tuition wireless telegraph or telephone stations unless they shall first obtain the authorisation of one of the departments of the Administration according to each case, after hearing the Combined Technical Committee.

Section 2.—The Combined Technical Committee shall be informed by the Departments interested of the results obtained with the different types of apparatus or systems of erection employed by the different stations under operation.

Section 3.—It shall pertain to the Combined Technical Committee to consider the complaints of a technical nature relative to the working of the different stations when informed by the Federal Departments and the administrations of the different States, by Private Enterprises or by Foreign Powers.

Section 4.—In the cases where the experiments of wireless telegraphy or telephony shall pertain to the initiative of the Combined Technical Committee by proposal made to any of the Departments of the Administration interested therein, the expense shall be for account of the Department having ordered such experiments.

Art. 19.—The Government shall take action in accordance with the laws in force with regard to ordinary telegraph matter against all those who shall operate wireless telegraph or telephone plants without permission, whether publicly or under concealment.

Sole Paragraph.—The fault to which this article refers shall in time of disturbance of the public order or of war be considered respectively as an act of resistance against the public authorities or as spying.

Art. 20.—Whether the Government may be obliged to maintain wireless telegraph stations for the public service in general in fortified places, whether of the Army or of the Navy, the matter will be considered by the Combined Technical Committee, in order to avoid prejudice in any way to the military services.

Section 1.—The stations to which this article refers shall be in time of peace operated by civilians, and in time of disturbances of the public order or of war by military operators.

Section 2.—While on duty in fortified quarters, whether of the Navy or of the Army, the civil employees shall be under the military rule.

ART. 21.—In case of interruption to the service of the overland telegraph lines the wireless telegraph stations shall take care of the telegraph service of the section where the interruption has occurred, without prejudice, however, to the "watch" and "ocean" services.

Section 1.—The military stations of the Navy and of the Army shall also undertake to forward the ordinary telegraphic service if they are situated in the section where the interruption has occurred, and are also to do so without prejudice to the military service.

Section 2.—The stations established along the rivers Parana, Uruguay and São Francisco shall, when necessary, serve as exchange stations between the borders and the coast.

Section 3.—For the better co-ordination of the services the Combined Technical Committee shall keep up to date the plan of the whole system referred to in Decree No. 10,090 of February 1st, 1913, so as to be able to be supplied to the interested authorities, whether federal or of the States.

GENERAL TELEGRAPH DEPARTMENT.

ART. 22.—The establishment and operation of the wireless telegraph and telephone stations intended for the service of the public in general and other services depending upon the Department of Roads and Public Works shall be pertinent to the General Telegraph Department.

Section 1.—The same department shall also centre in its hands all matters concerning the collection of taxes and administrative connections with foreign wireless telegraph services and with the International Office at Berne.

Section 2.—It shall see that the International Regulations for the transmission of commercial messages from the stations on board merchant ships are properly observed.

Section 3.—It shall exercise the supervision of private enterprises operating in wireless telegraphy and telephony.

Section 4.—It shall have the power to train wireless telegraph operators in accordance with the regulations in force by administering to them theoretical and specially practical tuition (Articles 271, 367 and 337 of the Regulations of 1911 in force) and awarding them the certificates referred to in the International Regulations (Art. X of 1912) and in the present Regulations (Art. 14, section 3).

Section 5.—Certificates of wireless telegraph operators awarded by the Institutions of Higher Studies and by the private professional schools shall be acknowledged by the Government after the approval of the Combined Technical Committee.

Section 6.—For the purposes of the experiments referred to in sub-section *d* of Art. 19 of Law No. 2,050 of the 31st December, 1908, and which may interest the Department of Roads and Public Works, a credit shall be reserved out of the appropriation for "wireless telegraph services."

ART. 23.—In military wireless telegraphy the same procedure shall be adopted as for civil wireless telegraphy in so far as the tuition of the wireless telegraph operators is con-

cerned, so that the programmes being formed on a common basis the certificates may also be considered as equivalent.

ART. 24.—Bearers of certificates of qualification awarded by the schools referred to in Arts. 22 and 23 alone shall be admitted to take charge or to serve as employees of the wireless telegraph stations, whether fixed or movable, civil or military, belonging to or authorised by the Government.

Section 1.—The provisions contained in Art. X of the International Regulations of 1912, extended by the provisions of Art. VI of the International Regulations of 1906 relative to the professional qualification of wireless telegraph operators shall be strictly observed.

Section 2.—The programmes and the course of proceedings at the schools shall be subject to the approval and supervision of the Combined Technical Committee in order to ensure the compliance with the provisions of the present regulations concerning the matter.

ART. 25.—Authorisations, permissions and licences for the establishment and operation of wireless telegraph and telephone services whether in the territory of the Union or of the different States shall be subject to the provisions in force relative to the ordinary telegraphic services. The new services are already placed on a like footing with the ordinary service, under the International provisions already approved by Congress, and by a decree of the executive power dated November 27th, 1911, issued under No. 9,148 as per sole paragraph of Art. 2 thereof.

ART. 26.—Telegraph stations erected on board merchant ships and ships of the coastal trade as referred to in Art. 173 of the Regulations approved by Decree No. 10,524 of October 23rd, 1913, shall be subject to the international provisions contained in Arts. IX and XI of the Regulations of London.

Section 1.—Licences for the establishment of the stations shall be applied for before the Department of Roads and Public Works to which it shall pertain to exercise the supervision referred to in Arts. IX, X, XI and XII of the Regulations of London.

Section 2.—The supervision of the stations erected on board ships as referred to in the last preceding article shall be under the care of the General Telegraph Department, to which the Department of Roads and Public Works shall give notice of the licences given.

Section 3.—Licences shall be given under the form hereunto appended.

Section 4.—The initials or indexes of calls from the stations on board national ships possessing the necessary licences shall be given by the General Telegraph Department in accordance with the provisions of the International Regulations in force (Section 2 of Art. V), and in accordance with the notices issued by the International Office at Berne.

Section 5.—With regard to infringements and penalties occurring in view of the licences given to ships and certificates of operators, the provisions of Arts. IX and XII of the Regulations of London shall be strictly enforced.

ART. 27.—The stations on board merchant ships or men-of-war shall be classed by the Government in three different classes which shall be expressed on the licences in the case of merchant ships, viz. :—

1. Stations with permanent service (N).
2. Stations with a limitation of service.
3. Stations not charged with special obligations (X).

The stations of the first class shall maintain continuous watch. The stations of the second class shall be permanently attend during the time of service, and out of this time of service during the first ten minutes of each hour. The stations of the third class shall not be subject to a regular service of attention (Art. XII, section 3, of the Regulations of London).

ART. 28.—Stations on board national ships must, and stations on board foreign ships may, communicate free of charge once a day to the fixed stations the meteorological bulletins for the Directorate of the Meteorological Service.

Section 1.—The ships shall also receive communication of the bulletins of the Meteorological Service that might interest navigation.

Section 2.—If the ships request the Meteorological Service to transmit to them meteorological information, the communications shall be made by means of taxed service advices, and the taxes shall be charged to the account of the ships to which such messages were transmitted.

Section 3.—Communication regarding the weather involving information relative to precautions to be taken against danger shall be transmitted free of charge and urgent.

ART. 29.—All wireless telegraph stations without exception, whether fixed or movable, shall keep a book of entries in which, besides the messages exchanged, note shall be taken of the commencement and winding up of the services when the case is not of a permanent service, of accidents that may have occurred, of difficulties of communication, damages to the apparatus, etc.; in short, of all details of the service.

Sole Paragraph.—The said stations shall also possess schematic charts of the ocean or of the rivers for the purpose of registering the position of the movable stations.

ART. 30.—The provisions of the international regulations concerning wireless telegraphy and of the Regulations of the General Telegraph Department shall apply respectively to foreign and home relations. In the home service the provisions of the present regulations for wireless telegraphy shall prevail over such provisions of the regulations of the General Telegraph Department as may be contrary thereto.

Sole Paragraph.—The provisions contained in military regulations and interesting wireless telegraph service in general shall be communicated to the General Telegraph Department by the Combined Technical Committee.

CHAPTER II.

Manner of Wording and Depositing Wireless Messages.

ART. 31.—Wireless telegraph messages shall contain as first word of the preamble the indication of the service "radio" (see Arts. XIV and XV of the Regulations of London).

Section 1.—The text of wireless messages may be in any one of the languages admitted by the International Telegraph Regulations for the time being in force (Revision of Lisbon, Art. 8, section 2).

Section 2.—Wireless messages made up by means of the International Code of Signals, designed under the index P R B, shall be transmitted to their destination untranslated.

Section 3.—Cases of doubt in the matter of traffic shall be considered and decided by the General Telegraph Department.

CHAPTER III.

Transmission of Wireless Messages, Calls, General Provisions for Traffic.

Consult International Telegraph Regulations of 1908, Art. LXII, Chapter 12, corresponding to Art. 9 of the Convention of St. Petersburg. Consult also Chapter 6 of the International Wireless Telegraph Regulations, 1912.

TRANSMISSION.

ART. 32.—For the transmission on wireless messages, the signals used shall be those of the International Morse Code.

Sole Paragraph.—Telegraphic sign shall be transmitted in accordance with the provisions and rules established by the regulations in force issued by the General Telegraph Department. (Consult Regulations of Lisbon, Chapter 10, Art. XXII.)

ART. 33.—Ships in distress shall employ the signal S O S, which shall be repeated at fixed intervals accompanied by the necessary information.

Upon noticing the signal of distress any and every station shall immediately interrupt the correspondence in hand, which shall not be resumed until the station shall have ascertained that the communication by the call for assistance is concluded.

Section 1.—Stations noticing a call for assistance shall observe the indication supplied by the ship making the call, not only in the order of communications but also in the termination thereof.

Section 2.—Whenever a series of calls for assistance shall be accompanied by the indexes of call from a certain station, this latter station alone shall be expected to attend, unless, however, the said station shall not reply.

In the absence of indication of a certain station, any station noticing the call for assistance shall be under the obligation to reply.

Section 3.—Wireless telegraph messages from or relative to ships in distress shall have preference above all others.

ART. 34.—In giving or requisitioning explanations in regard to wireless telegraph services, the different stations shall make use of the signals contained in the list appended to the present regulations and to the International Regulations, 1912.

ART. 35.—In transmitting wireless telegraphic messages all the special indexes contained in the International Telegraph Regulations, revised in Lisbon, shall not be admitted; only those indexes contained in the International Wireless Telegraph Regulations of London, Art. XXXVIII, shall be admitted.

Section 1.—With regard to wireless telegraphic messages for transmission by express, when the expenses shall have been collected from the receiver, the General Telegraph Department shall establish special instructions which shall be notified to the International Office.

Section 2.—It will be permitted to make special indication relative to the number of days during which wireless telegraphic messages shall have to remain in deposit at a coastal station awaiting the passage of the ship for which they are intended.

ART. 36.—As between any two stations wireless telegraphic messages of the same class shall be transmitted separately and alternately or by series of various messages according to the indication of the coastal station, on con-

dition that the time for transmission of each series shall not be more than 15 minutes.

Section 1.—Before commencing to exchange correspondence the coastal station shall advise the station on board ship whether the transmission will be made alternatively or by series. Then the coastal station shall commence transmitting or notify its readiness to receive.

Section 2.—The transmission of each wireless telegraphic message shall be preceded by the signal $\bullet \bullet \bullet \bullet$ and terminated by the signal $\bullet \bullet \bullet \bullet$ followed by the index of the sending station and of the signal $\bullet \bullet \bullet \bullet$. In the case of a series of messages, the index of the sending station and the signal $\bullet \bullet \bullet \bullet$ shall only be given at the end of the series.

Section 3.—Wireless telegraph messages shall be transmitted in the following order:—

- (a) Messages of the State.
 - (b) Messages of the Service.
 - (c) Private urgent messages, but only in respect of their course over the overland lines.
 - (d) Ordinary private messages.
- (Compare Regulations of Lisbon, Art. XXXII.)

CALLS.

ART. 37.—The control of the service on the stations on board ships lying within the maximum reach of any coastal station shall be exercised by the latter.

Section 1.—Stations on board ship and also limited coastal stations shall conform with the instructions received from the permanent station.

Section 2.—The permanent coastal station shall attend and cause attention to be given to ships on the point of leaving the zone of their common reach, having in view the position, direction and speed of the said ships.

Section 3.—The permanent coastal station shall have authority to transmit orders for silence; the station on board ship shall thereupon cease transmitting ordinary messages until it shall be allowed to continue.

Section 4.—Besides in the case of traffic conveniences, silence may be imposed in view of the provisions of Art. 45 of the Regulations of London (hour service).

Section 5.—Any station proposing to transmit with high power shall first issue three times the sign of attention, M I M ($\bullet \bullet \bullet \bullet$), using the lowest power necessary to reach the neighbouring stations. It shall not commence transmitting with high power before 30 seconds after having issued the sign of attention.

Section 6.—Whenever any one coastal station shall receive calls from several stations on board ships at one time it shall decide as to the order in which those stations shall be admitted to transmit.

In taking this decision the coastal stations shall have in view simply the necessity of permitting any one station interested to exchange the greatest possible number of wireless messages.

Section 7.—In the event of any one station failing to attend to the calls issued three times with an interval of 2 minutes, the said calls shall not be renewed before a further interval of 15 minutes, and even so when the station having made the call shall be certain that there is no other wireless telegraphic communication under way.

ART. 38.—In general it is the station on board ship that calls up the coastal station, whether there be wireless messages for transmission or not.

Section 1.—The station on board ship shall not call up the coastal station, chiefly in the

zones of a heavy traffic, before it comes within a distance of $\frac{1}{2}$ of the normal reach of the latter.

Section 2.—Before proceeding to make calls, the coastal station or the station on board ship shall regulate to the highest sensitive point possible their receiver system, and ascertain that no other correspondence is being held within the zone of reach; when they shall proceed otherwise, upon remarking any disturbances of correspondence the coastal station or the station on board ship shall immediately cease calling, unless they shall find that the calls are not apt to disturb the communications under way.

Section 3.—On the other hand, the coastal stations or the stations on board ship when answering calls made upon them shall take the same precautions.

Section 4.—If notwithstanding these precautions the transmission of any wireless telegraphic message shall be interfered with, the call should cease for the traffic of public correspondence. This station, in making the request, shall indicate the approximate duration of the delay.

Section 5.—The station on board ship shall inform the coastal station to which it shall have signalled its presence the moment at which it shall have to interrupt communications and the time during which this interruption shall last.

Section 6.—The station on board ship shall only be allowed to make calls upon the next coastal station in cases where, owing to difficulties of traffic, it shall not have been possible to establish correspondence with the preceding station, out of whose reach it has just come.

Section 7.—In making calls the station shall employ the normal wave of the station on which they shall have to call.

Section 8.—All stations shall seek to transmit by using the lowest possible intensity.

ART. 39.—The call shall be composed of the signal K A ($\bullet \bullet \bullet \bullet$) of the index of the station upon which the call is made, issued three times, that of the preposition "from" (de) followed by the index of the transmitting station, repeated three times.

Section 1.—The station called upon shall reply by transmitting the signal $\bullet \bullet \bullet \bullet$ followed by the index of the corresponding station repeated three times; of the proposition "from" (de) and of the signal K ($\bullet \bullet \bullet \bullet$) (invitation to transmit).

Section 2.—Stations wishing to entertain correspondence with ships, but not knowing the names of such as may be within their reach, shall employ the signal of investigation ($\bullet \bullet \bullet \bullet$).

Section 3.—The provisions of the present article and of section 1 shall also apply for transmission of the signal of investigation and the reply to the said signal.

GENERAL PROVISIONS.

ART. 40.—Transmissions exchange between stations on board ship shall be effected in such a way that they shall not interfere with the services of the coastal stations, and the latter shall have the right of priority for public correspondence.

ART. 41.—As soon as the coastal station shall have answered the call, the station on board ship shall supply the details hereunder stated in the event of there being messages for transmission; these details shall likewise be supplied on demand by the coastal station:

(a) Approximate distance in nautical miles from the ship to the coastal station;

(b) The position of the ship, indicated in a concise form adequate to the circumstances of each case;

(c) The name of the next port of call of the ship;

(d) The number of wireless messages if of normal length (20 words) and the number of words in case of exceptionally long messages;

(e) The speed of the ship expressed in nautical miles when the coastal station shall require this information expressly.

Section 1.—On answering the coastal station shall inform the number of wireless messages or the number of words to be transmitted to the station on board, as the case may be; it shall also indicate the order in which the transmission shall be effected.

Section 2.—In case the transmission cannot be effected immediately, the coastal station shall inform the station on board of the probable time it shall have to wait, and in case this delay shall be more than ten minutes shall also give the reasons therefor. The station on board ship shall await the invitation to transmit K (— — — —).

Section 3.—In the event of a station on board ship being called up and being unable to receive momentarily, it shall advise the station from which the call is made of the approximate time it shall have to wait.

Section 4.—In the case of exchange of correspondence between two stations on board ships, it shall pertain to the station on which the call is made to determine the order of transmission.

Art. 42.—Whenever a wireless message shall contain more than 40 words, the sending station shall interrupt transmission by means of the signal UD (interrogation) (— — — — —) after each series of 20 words more or less, and shall not continue transmitting until it shall have received from the receiving station the repetition of the last word properly understood followed by the signal above referred to, or, if the reception was satisfactory, then followed by the signal — — — —.

Sole Paragraph.—In case of transmission by series, the notice of reception shall be given after each message.

Art. 43.—When the signals become doubtful it will be well to exert the best efforts to conclude transmission.

For this purpose the message shall be transmitted three times at the most, on demand of the receiving station.

Section 1.—If notwithstanding this treble transmission the signs shall still be unintelligible, the message shall be cancelled.

Section 2.—If the receipt advice is not received, the transmitting station shall make a fresh call on the receiving station. If no answer is made after the third call the transmission shall not proceed.

In this case the sending station shall have the faculty to obtain the receipt advice through another wireless telegraph station by utilising in case of necessity the overland lines.

Art. 44.—When the receiving station shall be of opinion that, notwithstanding a defective reception, the message can be delivered, it shall insert at the end of the preamble the service remark "reception doubtful," and shall forward the message.

Sole Paragraph.—In the event of the telegraph lines being utilised the General Telegraph Department shall recover the taxes in accord-

ance with the provisions of Art. XLII of the Regulations of London. But if the station on board shall subsequently transmit the message to another coastal station, the G.T.D. shall recover taxes relative to one sole transmission.

Art. 45.—Receipt notices shall be given in the manner determined by the index of the sending station and followed by the index of the receiving station.

Section 1.—The end of the service between any two stations shall be indicated by both by means of the signal — — — — — followed by their indexes respectively.

Section 2.—Ships not possessing indexes shall substitute the sign by their own name in full.

Art. 46.—Coastal stations whose service shall not be of a permanent nature shall not be permitted to wind up their service until they shall have transmitted their messages to the ships within their reach, not until they shall have received from the ships all the messages announced.

Sole Paragraph.—These provisions shall also apply in cases where ships shall notify their presence before the work of station is definitely ended.

Art. 47.—In transmitting messages from a station on board ship to a coastal station the date and hour of presentation at the station on board shall be included in the preamble.

Sole Paragraph.—In cases of re-transmission the coastal station shall cause to appear as of the station of origin the name of the ship from which the message was originally sent, and also, if possible, the name of the ship having served as intermediary, if any.

Art. 48.—In transmitting, receiving, verifying the words, repetitions and doubtful cases, the proceedings shall be in accordance with the provisions and rules in force for ordinary traffic as contained in the Regulations of the General Telegraph Department, 1911, and in the International Telegraph Regulations (1908).

Art. 49.—The sender shall have the right to indicate the number of days, but not more than 30 days, during which the telegram shall remain in deposit for transmission at the first opportunity to its destination.

Section 1.—The indication "radio in deposit" shall be reckoned as one word.

Section 2.—After the delay indicated shall have expired, or when the coastal station shall have acquired a certainty that the ship is already beyond the reach of the next coastal station, it shall advise the sender of the fact.

Art. 50.—In the national service, as well as in the international service, the provisions of Art. VI of the Wireless Telegraph Regulations of London as hereunder shall strictly apply—viz. :—

(1) Exchange of superfluous signals or words shall not be allowed.

(2) Tests and exercises shall only be admitted when not interfering with the service of other stations.

(3) Tests to be effected with wavelengths other than those admitted for public correspondence and with the lowest possible energy.

Art. 51.—The dangerous parts of the apparatus in the different stations shall be determined by means of plainly visible marks, and if necessary they shall even be covered up in order to avoid contact with the operators or visitors.

Art. 52.—The address of wireless messages for transmission to shipping shall be as com-

plete as possible. They shall contain obligatorily the following:—

(a) Name and qualification of the addressee, with full information, if any;

(b) Name of the ship exactly as contained in the first column of the nomenclature;

(c) Name of the coastal station exactly as contained in the nomenclature.

Section 1.—The name of the ship may be substituted by an indication of the route followed by the ship and determined by stating the port of origin or of destination or any other equivalent reference, at the risks and for account of the sender.

Section 2.—The name of the ship exactly as contained in the first column of the nomenclature shall in every case, and notwithstanding its length, be reckoned as one sole word when contained in the address.

Section 3.—The sender shall indicate the name of the coastal station through which the message is to be transmitted to the ship.

ART. 53.—Transmission to the stations on board ship as a rule shall only be effected when the ships on passing by call on the coastal station within their reach.

Sole Paragraph.—In wireless messages transmitted from on board ship the name of the coastal station shall appear in the preamble beside the name of the ship from which it was originally sent and followed by the name of the intermediary ship, if any; also the date and hour of presentation to the station on board ship.

ART. 54.—As a rule the stations on board should transmit their messages to the nearest coastal station.

Section 1.—The sender on board ship shall have the option of choosing the coastal station through which he desires his message to be forwarded. In this case the ship's station shall wait until the station selected shall be the nearest coastal station.

Section 2.—On the borders of the neighbouring Republics the transmission referred to in the last preceding paragraph may be made by a coastal station situated farther off. For this purpose it shall become necessary for such coastal station to be situated in the country of destination of the message and for the ship from which the message was sent to sail under the flag of the same country. (*ART. XXXV, section 2, of the International Regulations of London.*)

Section 3.—In cases where the stations on board ship shall be in a position to choose between different coastal stations situated at approximately equal distances, then they shall give preference to the coastal station established in the country of destination of the message or serving for the normal transit of wireless messages sent thereinto.

CHAPTER V.*

(* There would appear to be some clerical error here, either on the part of the draftsman of the Law or the translator. The Law, however, as it stands in our text is complete: the error resides in the consecutive numbering of the chapters.—EDITOR.)

ART. 55.—The tax of one wireless telegraphic message shall consist of the following, as the case may be:

1. The coastal tax, due to the coastal station.

2. The ship's tax, due to the ship's station.

3. The tax due for transmission over the telegraphic lines, reckoned according to the common practice.

4. The transit taxes of the coastal stations or of the intermediary ships and the taxes relative to the special services demanded by the sender.

ART. 56.—The entire amount of the tax shall be recovered from the sender with the exception of the following:—

1. The express rates (*ART. LVIII, section 1, of the Telegraph Regulations, revised in Lisbon*).

2. The amount of the taxes applicable on such reunions or alterations of words, not allowed, as may be detected by the station of destination (*ART. XIX, section 9, of the Telegraph Regulations*).

These taxes shall be recovered from the receiver or addressee.

Sole Paragraph.—Stations on board ship should possess the necessary tariffs enabling them to supply these provisions, and they shall receive them in due course from the General Telegraph Department. They shall, however, have the faculty to consult the coastal stations with regard to the taxation of wireless messages, in case they do not themselves possess the necessary information for the purpose.

ART. 57.—The General Telegraph Department shall organise instructions relative to the taxation of the wireless messages, and shall in so doing consider carefully the various cases of the traffic. These instructions shall be distributed among the parties interested in the matter.

Sole Paragraph.—The said department shall further organise instructions for the keeping of proper accounts in order to facilitate and simplify the extraction of the different accounts.

CHAPTER VI.

ACCOUNTS.

ART. 58.—Coastal and ship's taxes shall not be considered in the accounts provided for under the International Telegraph Regulations. Accounts relative to these taxes shall be settled by the administration of each one of the countries interested.

Section 1.—If the coastal stations shall be independent of the Department of Roads and Public Works, the accounts shall be made up by the General Telegraph Department and communicated by the said department to the interested parties, whether public administrations or private parties.

Section 2.—In cases where the coastal station shall be under the control of the private enterprises, the holder thereof shall have the right to arrange his accounts directly with the interested parties (*ART. XLI, section 1, of the Radiotelegraphic Convention of London*) without the interference of the General Telegraph Department.

ART. 59.—It shall pertain to the General Telegraph Department to make arrangements with private enterprises operating wireless telegraph plants in the country whether by means of fixed or movable stations, for the establishment of mutual traffic and for the eventual settlement of accounts in accordance with the provisions of *ART. XLII* and paragraphs of the Regulations of London.

ART. 60.—It shall pertain to the Department of Roads and Public Works to make special arrangements with the neighbouring republics whether directly with their respective Governments or with private parties established and operating therein, for the purpose of establishing mutual traffic and adopting the provisions relative to keeping of accounts (*Regulations of London, ART. XLII, section 4*).

CHAPTER VII.

QUALIFICATIONS OF WIRELESS OPERATORS.

(Compare Art. 10 of the Regulations of London, 1912, and Art. 6, section 3, of the Regulations of Berlin, 1906.)

Art. 61.—Certificates of qualification of operators intending to work at the fixed and movable wireless telegraph stations which shall be issued by the official schools or by private schools acknowledged by the Government in accordance with the present regulations shall attest the professional standing of the operators with regard to:

(a) Transmission and reception by the ear of messages drawn up in plain language with the Morse International alphabet at the rate of 20 words per minute at least—each group of five letters counting as one word.

(b) Regulation of the apparatus and acquaintance with their work. This preparation should embrace the study of the most common systems, chiefly of those systems employed in the Brazilian system of wireless telegraphy.

(c) Acquaintance with the provisions of the Conventions and Regulations and of the rules applicable to the exchange of wireless and ordinary telegraphic communications.

Art. 62.—In passing their examinations the candidates for certificates shall:

(a) Operate ordinary transmission with the Morse during five minutes consecutively, at a minimum rate of 20 words per minute, each group of five letters counting as one word.

(b) Receive and hear legibly, at the same rate mentioned above, with the aid of a double telephone receiver mounted to the head in the ordinary manner for reception in wireless telegraphy.

(c) Understand the simple diagrams of the electrical connections of the apparatus used in the system adopted for the examination.

(d) Enumerate the principal parts of the apparatus stating the use thereof, in such a way as to demonstrate that they would be capable of mounting the apparatus with the assistance of the diagrams.

(e) Mention the accidents occurring more frequently, and the means usually employed to repair them.

(f) Explain what is to be done in order to pass from one wavelength to another in transmitting or in receiving.

(g) Effect (1) regulations and adjustments; (2) alteration of wavelengths; (3) reduction and increase of transmission energy; (4) investigation of accidents and remedies therefor.

Art. 63.—There shall be two classes of certificates: first and second class. The sole difference between these two classes of certificates shall be in respect of speed of transmission and of reception: first-class certificates shall correspond to a rate of 20 words, at least, per minute; those of the second class shall correspond to a speed ranging between 12 and 19 words per minute.

Art. 64.—In the wireless telegraph stations on board ship due regard will be paid to the provisions of Art. X of the International Regulations of London relating to the utilisation of operators holding certificates of the first and second classes.

Sole Paragraph.—In the fixed stations service shall be assumed at least by two operators

holding certificates of the first class; holders of certificates of the second class shall be admitted as assistants. Only in cases of urgency may transmissions be effected by non-certificated operators.

Art. 65.—With a view to the preparation of wireless telegraph operators the Government shall have the power, subject always to the provisions of the Organic Law of Tuition, to grant subventions to private schools in order to facilitate the preparation of these operators in the capital of the Republic and in the different States.

Sole Paragraph.—For the official schools whether civil or military, the Government shall have the power to contract, either in the country or abroad, qualified persons for the purpose of administering practical tuition.

Art. 66.—The certificates shall testify to the professional standing of the wireless telegraph operators in accordance with the provisions of Arts. 61, 62 and 63, and shall contain a statement to the effect that the holder thereof shall keep the secrecy of correspondence in accordance with the national and international prescriptions.

Art. 67.—Certificates awarded by private schools must be registered at the Department of Roads and Public Works, where they will be attested by the Government in accordance with the requirements of the present Regulations and of the International Regulations, Art. 10.

Rio de Janeiro, January 14th, 1914.

FORM OF LICENCE.

(Coat of Arms).

REPUBLIC OF THE UNITED STATES OF BRAZIL—
DEPARTMENT OF ROADS AND PUBLIC
WORKS.

F LICENCE for the establishment and operation of wireless telegraph stations on board ships in accordance with Arts. 9 and 13 of the International Regulations of London, and with Art. 173 of Decree No. 10,524 of October 23rd, 1913, referring to merchant and coast trade navy.

Licence is given by the Department of Roads and Public Works to.....
.....
during the period of two years as from the present date, to—

I.—Establish and operate on board the steamship.....one wireless telegraph station of the system known as..... subject to the following conditions: (1) the station to be established shall comply with the specifications hereunto appended; (2) the apparatus shall be syntonised; (3) the apparatus shall be capable of supporting traffic by means of waves of 300 and of 600 metres and other lengths not greater than 600 metres, the use of which may be authorised by the Government; (4) the speed of transmission and of reception of wireless messages under normal circumstances shall not be lower than 12 words per minute, counting five letters to the word.

II.—Transmit and receive wireless messages by means of the station licensed for establishment on the said ship and of the stations established on board other ships and of the fixed stations; all in accordance with the regulations in force.

The present licence is granted subject to the following conditions:—

1. The licensed station shall be operated

solely by the licensee or by another person duly authorised by law.

2. The operators shall not interfere with the signals from the stations of the Army and of the Navy; they shall observe the Conventions and Regulations in force, and they shall further transmit wireless messages, on a footing of equal treatment, without favours or preferences.

3. The operators shall whenever possible receive from ships and lighthouses all calls for assistance and signals of distress, and shall answer such signals and forward them with the least possible delay to the proper authorities, either by means of his own station or through other stations or yet by another means.

4. The station shall only be operated by a holder of a certificate awarded by the Government as provided for in the National Wireless Telegraph Regulations in force.

5. The licensee and his operators shall keep complete secrecy of the wireless telegraphic correspondence in general, whether transmitted to his station or received for transmission to others.

6. Licensee shall keep proper accounts of the traffic of his station and keep on file all the messages transmitted and received by the said station, each message to bear a number of identity, the date and note of origin and destination. He shall keep all the messages received and transmitted for the period of time stipulated in the International Regulations. The archives may be inspected by the General Telegraph Department whenever it may be deemed convenient.

7. The licensee shall make arrangements by entering into a contract with the General Telegraph Department with regard to the accounts of traffic between the coastal stations and the stations licensed hereby.

8. The General Telegraph Department through one of its delegates may, at any time, inspect the station licensed hereby, and examine the apparatus and the station in general and in every detail.

9. Licensee shall keep at the station licensed hereby the present licence or a certified copy of same; also all printed matter necessary for the traffic in accordance with the Convention and Regulations in force.

10. This department of the Administration shall have the power to interrupt the present licence in case of non-observance or failure on the part of licensee to comply with the clauses hereinabove stipulated.

The station authorised by the present licence shall be employed in the service of in accordance with section 3 of Art. 13 of the International Regulations of London, 1912.

Directorate General of Post, Telegraphs and Light.

..... *Director General.*

..... *Director of the Division.*

ATTEST.

..... *Director General of Telegraphs.*

WIRELESS LAW NO. 3,296.

JULY 10TH, 1917.

G The National Congress resolves:—
ART. 1.—The service of radiotelegraphs (telegraphs without wires) in the territories and territorial waters of Brazil is exclusively within the sphere of federal Government.

Sole Paragraph.—The service of radiotelegraphy comprises also radiotelephony (telephones without wires).

ART. 2.—The establishment and exploitation of radiotelegraph stations are within the sphere of the Ministry of Public Works, in respect to its application of a civil character and the Ministries of War and Marine in reference to its applications destined to national defence and to the service of the Army and Navy.

Sole Paragraph.—The three above-mentioned Ministries will enter into an agreement in respect to the localities in which must be established the stations necessary for commerce, for navigation and for the defence of the national territory.

ART. 3.—The Government may give permission to third parties, nationals, without monopoly whatsoever, to instal or work one or more high-power stations in suitable places on the littoral; under the terms of the International Regulations concerning wireless telegraphy and also the Brazilian regulations which are in force for the execution of the same service; for the exclusive purpose of establishing inter-oceanic and inter-territorial communications with corresponding stations in other countries.

PAR. 1.—These stations must be linked with the National Telegraphs, by whose intermediary shall be collected and distributed the international radiotelegraphic service to and from Brazil in such a manner that the Government shall receive the terminal rate in force.

PAR. 2.—The rights that are conferred and the disposals contained in this article may only be used by the Government after the conclusions adopted in respect to this subject by the International Pan-American Convention, which at the recent conference in Buenos Aires was arranged should be held at Washington in 1917.

ART. 4.—The States within the area of their territories which are not yet served by telegraphs with or without wires, and may wish to establish radiotelegraphic stations, shall interest the Department of Telegraphs to instal and work them, debiting the respective costs against such States, and for the purposes of the adjustment of the accounts shall be considered as mutual traffic administrations with the Department.

ART. 5.—The National shipping companies whose steamers have accommodation for more than 50 passengers and whose voyages are longer than 150 miles from the port of origin of its ships and the site of the registered office of the company must instal on board of such steamers a radiotelegraphic station with a minimum range of 100 nautical miles, which shall be worked by an operator who holds a certificate of fitness granted by competent authority. The installations on board shall be provided with emergency apparatus and battery which will permit a continuation of the service in case of the failure of supply of electrical energy by the generators that depend on the main installation.

ART. 6.—Foreign ships will be permitted within or without the territorial waters of Brazil to use the radiotelegraphic stations which they have mounted on board to correspond with the coastal stations erected by the Department of Ways and Public Works previously being authorised by the same Ministry or the

Department to this end and subject to the prescriptions and regulations governing this service.

Paragraph.—Foreign warships will be licensed by the authority designated by the Minister for Marine.

ART. 7.—The establishment and working of the coastal radiotelegraphic stations and others of a civil character in the interior of the country will be entrusted to the Department of Telegraphs, to which will fall the duty also of the superintendence and carrying out of all the service of fiscalisation in relation to the employment of this kind of telegraph system by the State by national shipping companies whether by fixed or moving stations and the execution of administrative acts, the promulgation of the dates of openings, the range and the class of each station and the inauguration of proceedings relative to misdemeanours committed against this branch of the service.

Sole Paragraph.—The said Department shall create a special section to which shall be entrusted the management of the service, and also it shall form a school of radiotelegraphy and it shall have authority to contract within or without the country with a professional teacher to take charge of the said school. The only persons qualified or admissible for the personnel of the said radiotelegraphic stations shall be nationals, holders of a certificate of competency issued by the above school, or by other holders of diplomas, admitted to work in the country.

ART. 8.—All the radiotelegraphic stations that were established in Brazilian territory and on board of national ships and on board of foreign ships whilst they remain or navigate on the rivers or territorial waters of Brazil, and claim to establish communication with the national stations for this purpose authorised, must be subject to the rules and regulations of the interior and international services that may be in force.

ART. 9.—Radiotelegraphic correspondence is authorised between national mercantile ships and also between them and foreign ships that possess radiotelegraphic stations aboard as well as between the said ships and the Brazilian coast stations dependent upon the Ministry of Public Works.

ART. 10.—Whatever concession to persons for the establishment of a radiotelegraphic service or whatever authorisation given to use the respective apparatus installed on board foreign ships may be revoked if they do not comply with the rules and regulations or if the Ministries of Marine and War judge it necessary for the security of the country or its defence.

ART. 11.—When the civil or military Federal authorities dependants of the Ministries referred to in Art. 2 have to make scientific or technical experiments in radiotelegraphy they must give notice to the Ministries to which they depend, and when they make experiments on behalf of functionaries of other Ministries, then they must give notice to the Ministry of Ways and Works.

ART. 12.—No other besides the Federal authorities may make experiments or establish experimental radiotelegraphic stations without previous permission of the Ministry of Ways and Public Works, who can give the same with the restrictions and cautions necessary for the security and interests of the State and the efficiency of the traffic of the official stations.

ART. 13.—All the rules and regulations of the Department-General of Telegraphs shall

apply to the service of radiotelegraphy with reference to the secrecy to telegrams and as to damages caused to the stations or their material

ART. 14.—The Government will proceed in the terms of the legislation in force against those who, without permission, exploit, whether publicly or clandestinely, a radiotelegraphic service, and in time of the disturbance of public order or external war these offences shall be classified and punished in the first case as an act of resistance to constituted authority and in the last case as an act of spying.

ART. 15.—Those coastal and interior radiotelegraphic stations which are dependencies of the Ministry of Ways and Public Works, and not reserved for special purposes, will be open for public correspondence.

Sole Paragraph.—No responsibility will be accepted by the radiotelegraphic service for errors of the service or faulty delivery of telegrams, in the terms of Art. 41 of the regulations revised in London.

ART. 16.—Any Brazilian radiotelegraphic station, whether civil or military, terrestrial or marine, will be obliged to give preferential attention to calls for succour that are received by them.

ART. 17.—In all radiotelegraphic stations the public service shall have preference to private service, save in cases of *force majeure* (accidents and calls for succour).

ART. 18.—Whatever be the object for which radiotelegraphy be established the respective services shall be organised in a form not to cause disturbance to other radiotelegraphic stations, and the respective Ministries shall in all cases adopt provisions and rules necessary to such end.

ART. 19.—Radiotelegrams proceeding from a ship which flies a flag of a non-adherent country to the regulations upon radiotelegraphs of the Convention of London as well as those addressed to ships of such countries shall be transmitted by Brazilian stations only in cases where the respective country has previously declared that it will conform to those rules and regulations in the adjustment of accounts.

ART. 20.—When the Ministries of Marine or War have to establish radiotelegraphic stations for special ends in strategic points and fortified places on land or sea, they will proceed in agreement with each other and with the Ministry of Ways and Public Works when choosing of the site and deciding upon the manner of carrying out the work, to the end that they shall not interfere with their mutual traffics.

These stations may be worked by telegraphists of the civil administration.

Whilst civil functionaries man the stations established in strategic or fortified places they shall be subject to military regime.

ART. 21.—All coastal radiotelegraph stations worked by the Department of General Telegraphs must receive and transmit meteorological observations, and there must be provided installations at one or more stations of the apparatus necessary to transmit time signals in the manner established by the Time Conference held in Paris in October, 1912.

Sole Paragraph.—The national ships provided with apparatus for wireless telegraphy and the foreign ships in the same condition can signal to the coast stations when they are within reach of them their observations about the weather, which will be communicated to the Meteorological Observatory of Rio de Janeiro,

and to the ships, on the other hand, will be communicated the observations from that Observatory.

ART. 22.—To the radiotelegraphic service of Brazil are applicable the International Radiotelegraphic Convention held in London and the rules which may be laid down for the execution of the present law.

ART. 23.—The adjustment of accounts shall be made six-monthly between the Department General of Telegraphs and the agencies of the companies of national and foreign ships, and in their absence with the administrations to which those ships are attached in accordance with what is established by Art. XLII of the International Regulations (revised in London).

ART. 24.—The call letters of the stations on board the national war and merchant ships will be distributed by the Department of General Telegraphs in accordance with the series of indicators reserved for Brazil by the Secretary of the International Union of Telegraphs of Berne.

ART. 25.—The radiotelegraphic stations in the interior of the country shall be established and worked by the Department of General Telegraphs, organising proper radiotelegraphic districts in regions where there are none, connecting them with the telegraphic service by means of wired lines and working with a parallel service of wired telegraphs.

ART. 26.—Annuling all whatsoever acts in this connection effected by the Government prior to the promulgation of the present law.

ART. 27.—It shall be the sphere of the Ministry of Ways and Public Works to make provision for the establishment and initiation of an international radiotelegraphic service and with the adjoining countries as well as the drawing up of the basis of a definite agreement and referendum to the National Congress.

ART. 28.—All previous acts to the contrary are revoked.

DECREE No. 3,316.

(Extract from.)

H Included in a Finance Bill, passed by Congress, signed and put into operation by the President of the Brazilian Republic on August 16th, 1917; we find a clause dealing with wireless telegraphy which authorises the Government to—

"Complete the services of Telegraphy, Radiotelegraphy and Telephony, to establish all the communications necessary for Military and Naval service."

The final clause of this same Act makes the following provision, which would appear likely to have some special reference to Decree No. 3296 of the 10th July, 1917: "Revoke all dispositions to the contrary."

PROJECT No. 367. 1919.

I For the organisation of the Radiotelegraph Service of the National Army.

The Radiotelegraph Service of the Army was created in 1914, and includes all the fixed radiotelegraph stations belonging to the Ministry of War, with a cadre of 30 radiotelegraphists for the purpose of operating them.

The Director of this service is a first lieutenant of the first Battalion of Engineers.

The cadre comprises 10 radiotelegraphists of the first and 20 of the second class.

From 1914 to the present time no modification has been made in the organisation of this important service, the regular working of which requires remodelling for the improvement of the technical conditions, in view of the extent it has assumed by reason of the acquisition of field radiotelegraph material, and the ever increasing employment of this means of communication between the various sections of the army.

The original organisation no longer satisfies the present radiotelegraphic requirements as regards field and fixed stations.

The recent acquisition of 16 field stations has brought with it the necessity for equipping them with qualified radiotelegraphists in order to ensure their perfect working and maintenance.

It is evident that these radiotelegraphists must possess certificates of competency, issued by the School of the General Administration of Telegraphs, or by other schools also authorised to work in the country, in conformity with the legislation in force.

Furthermore, the maintenance of radiotelegraph material renders necessary the establishment of a complete depot for the repair of any damage and the adjustment of apparatus.

To meet all these exigencies I propose the following:

PARLIAMENTARY BILL.

The National Congress decrees:

ART. 1.—The Radiotelegraph service of the Army is composed of:

(a) Fixed radiotelegraph stations of the National Army.

(b) A radiotelegraph school similar to the School of the General Administration of Telegraphs, to prepare, theoretically and practically, the necessary radiotelegraphists for the service of the fixed stations and the field stations of all arms.

(c) A material depot to supply all stations.

ART. 2.—The direction of the radiotelegraph service will devolve upon the Commander of the first battalion of engineers, who will have as auxiliaries two subaltern officers of the Engineers.

ART. 3.—The school of Radiotelegraphy will work in the first Battalion of Engineers.

ART. 4.—The following shall be the personnel of the radiotelegraph service:

7 radiotelegraphists of the first class and 14 of the second class for the fixed stations.

1 assistant administrative technician, first-class radio.

1 assistant of the radiotelegraph school, of the first class.

1 assistant instructor of the military school, of the first class.

1 first-class radiotelegraphist at the school of aviation.

6 officers in charge of field stations, radios of second class.

2 second-class radiotelegraphists in the school of aviation.

1 second sergeant electrical mechanic, one chief mechanic and three soldier auxiliaries, for the workshops and depots.

ART. 5.—For the organisation of the workshops, depots and radiotelegraph school, the Government shall be authorised to spend the amount of 20:000\$000, and an annual allowance of 4:000\$000 to meet the expenses of maintenance, repairs and cleaning of material, and minor expenses.

ART. 6.—The auxiliaries of the director of the radiotelegraph service shall be the supplementary cadre of the Engineers.

ART. 7.—Radio telegraphists of the first class shall receive the pay of "Sargento ajudante," those of the second class shall receive the pay of first sergeant, plus the daily allowance of \$5000.

ART. 8.—Auxiliaries shall receive the pay of their class, plus a daily allowance of \$3000, and shall be appointed by competitive examination.

ART. 9.—The number of radiotelegraphists

of the first and second classes is subject to variation according to the number of stations in operation, in the ratio of one of the first class and two of the second class for each station.

ART. 10.—The Government shall pass this Bill into law.

ART. 11.—All provisions to the contrary are hereby revoked.

Sala das Sessões, 22nd September, 1919.

OCTAVIO DA ROCHA.

BRITISH EAST AFRICA

(See KENYALAND COLONY.)

BRITISH GUIANA

THIS Colony, which includes the counties of Demerara, Essequibo and Berbice, lies on the north-east coast of South America, and has a total area of 90,277 square miles. The Government is administered by a Governor with a Court of Policy consisting of fifteen other members, seven official and eight elected.

CONTROL AND ORGANISATION.

Both the ownership and working of all radiotelegraphic stations are vested in the Government. Only one station is open for public correspondence with ships.

ADMINISTRATION.

The administration of wireless telegraphy is carried out under the following regulations:—

A—The Telegraphic Ordinance, 1903.

B—Ordinance No. 7 of 1910.

A This Ordinance may be cited as "The Telegraph Ordinance, 1903."

2. In this Ordinance "telegraph" means an electric, galvanic, or magnetic telegraph, and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communication by means of electricity, galvanism or magnetism, whether the same be transmitted by means of wires or cables or without wires or cables.

3. The Governor-in-Council shall have the exclusive privilege of establishing, maintaining and working telegraphs between the Colony and places outside of the Colony.

Provided that the Governor-in-Council may grant a licence on such conditions and in consideration of such payments as he thinks fit, to any person, company or body corporate, to establish, maintain or work a telegraph between the Colony and any place or places outside the Colony; and

Provided that nothing in this Ordinance shall apply to or in any way affect the rights already granted to the West India and Panama Telegraph Company, Limited, under any Ordinance or Ordinances passed before the Commencement of this Ordinance.

ORDINANCE No. 7 of 1910.

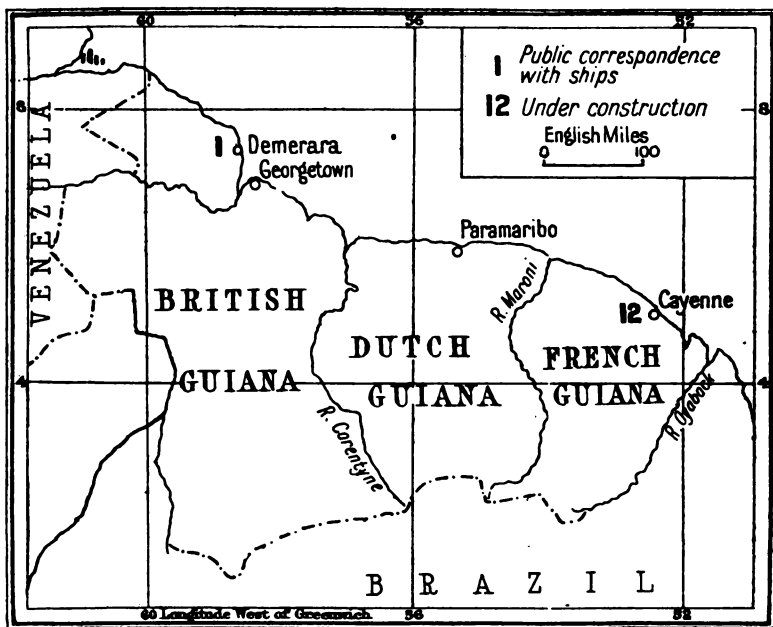
B 1. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony, except under and

in accordance with a licence granted in that behalf by the Governor-in-Council.

(2) A person shall not work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor-in-Council, and the Governor-in-Council may, by any such regulations, impose penalties recoverable summarily for the breach of any such regulations, not exceeding fifty dollars for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour and be liable on summary conviction thereof to a penalty not exceeding fifty dollars, and, on conviction on indictment, to a fine not exceeding five hundred dollars, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

(4) If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph



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station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under sub-section two of this section, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Governor or the Postmaster-General and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any apparatus which

appears to him to be used or intended to be used for wireless telegraphy therein.

(5) The expression "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided, That nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1910.

BRITISH HONDURAS

THE Crown Colony of British Honduras lies in Central America within $18^{\circ} 29' 5''$ to $15^{\circ} 53' 55''$ N. latitude and $89^{\circ} 9' 22''$ to $88^{\circ} 10'$ W. longitude. Its extreme length and breadth are 174 miles and 68 miles respectively; it abuts on the Atlantic, and is bounded on the north by Yucatan (Mexico), on the west and south by Guatemala, and on the east by the Caribbean Sea. The total area is about 8,598 square miles.

CONTROL.

Wireless telegraphy has seen some developments here since its first introduction, and both the ownership and working of the one radiotelegraphic station are vested in the Government. An experimental licence has been granted to S. John's Roman Catholic College in Form 2 issued by H.B.M. Postmaster-General in 1905. The Belize wireless station is open for continuous ship service, receiving calls on a 600 and answering on a 1,000 metre wave. Commercial traffic is also handled for the United States and the

United Kingdom, through the United Fruit Company's relay station at Swan Island (*see map of West Indies, under Leeward Islands*). The local toll of the station is ten cents per word. The through rate to any point in the United States is 35 cents per word and to the United Kingdom 62 cents per word.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Gerald S. W. Smith ..	Colonial Postmaster ..	Belize.
Mr. James Owen Hall ..	Superintendent of Wireless Telegraphs ..	Do.

During the war no privately owned apparatus was allowed in the colony, but laws are being prepared for the regulation thereof in accordance with the London Convention of 1912.

ADMINISTRATION.

Wireless telegraphy in British Honduras is regulated by Chapter CXCI of the Consolidated Laws of British Honduras (revised edition), the text of which will be found below.

A—Consolidated Law.

B—Schedule.

C—Licence to use Wireless Telegraphy for Experimental Purposes.

CHAPTER CXCI OF THE
CONSOLIDATED LAWS OF BRITISH
HONDURAS (REVISED EDITION).

TO REGULATE WIRELESS TELEGRAPHY.

A 1. *Interpretation.*—In this chapter "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *Licence to instal, &c., Wireless Telegraphic Apparatus.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

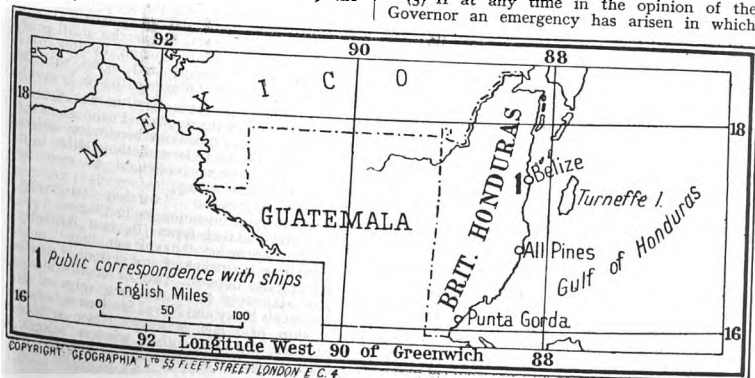
(2) Every such licence shall be in such form and for such period as the Governor may determine and shall contain the terms, conditions and restrictions on and subject to which it is granted.

3. *Apparatus not to be worked on merchant ship except in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this chapter.

4. *Regulations.*—(1) The Governor may from time to time make regulations for carrying into effect the purpose of this chapter, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this chapter.

(2) The regulations in the schedule to this chapter shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor an emergency has arisen in which



it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrants.*—If a District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship contrary to the provisions of this chapter or of any regulations made under this chapter, or of any licence granted under this chapter, he may grant a search warrant to any police officer or any person appointed in that behalf by the Superintendent of Police and named in the warrant and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalty for contravention of chapter.*—(1) Any person who shall offend against any provision of this chapter or any regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding two hundred and fifty dollars, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) *Procedure.*—Proceedings shall be taken before the District Commissioner for the Belize District on the complaint of the Superintendent of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

SCHEDULE—Section 4 (2). REGULATIONS.

B i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

ii. In these regulations "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

iv. For the purpose of any proceedings under

these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

EXPERIMENTAL FORM 2.

Dated

LICENCE TO USE WIRELESS TELEGRAPHY FOR
EXPERIMENTAL PURPOSES.

This Indenture made the
day of _____ One thousand
nine hundred and _____

between the Colonial Secretary of the Colony of British Honduras on behalf of the Government of British Honduras of the one part and (hereinafter called "the licensee") of the other part.

Whereas the licensee is desirous of establishing installing and working an amateur wireless telegraph apparatus for demonstration purposes with the sole object of giving instruction in the Science Classes of Saint John's College;

And whereas by reason of the provisions of Chapter 199 of the Consolidated Laws (Revised Edition) it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place except under and in accordance with a licence granted in that behalf by the Governor and it is also unlawful save as in the said Law provided to transmit wireless telegrams within the Colony;

And whereas at the request of the licensee the Governor has agreed to grant to the licensee the licence powers and authorities hereinafter expressed and contained for the period upon the terms and subject to the stipulations and conditions hereinafter appearing;

Now this Indenture witnesseth that in consideration of the premises and of the matters hereinafter appearing it is hereby agreed and declared between and by the parties hereto and the licensee (as to the covenants and agreements hereinafter contained on his part) doth hereby covenant and agree with the Colonial Secretary and the Colonial Secretary (as to the covenants and agreements hereinafter contained on his part) in exercise of all powers and authorities enabling him in this behalf doth hereby covenant and agree with the licensee in manner following (that is to say):—

i. In these presents (and in the Schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say):—

The expression "wireless telegraphy" has the same meaning as in Chapter 199 of the Consolidated Laws (Revised Edition).

The expression "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or Naval Station and any other wireless telegraph station whether on shore or on any ship.

The expression "the Admiral's" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

2. Subject to the provisions of this Indenture the licensee shall during the term or period commencing on the and terminating on the have licence and permission from the Colonial Secretary—

to establish instal and work at the station specified in the Schedule hereto apparatus for wireless telegraphy (hereinafter called "the licensed apparatus") provided that the apparatus installed at such station shall be of the character specified in the said Schedule.

3. The licensed apparatus shall not be used by the licensee or by any person either on his behalf or by his permission for any purpose except for the purpose of conducting experiments in wireless telegraphy.

4. (1) The licensed apparatus shall be so worked as not to interfere with the working of any wireless telegraph station established in the Colony or the territorial waters abutting on the coasts thereof and in particular with the transmission or receipt of any messages between or at any wireless telegraph station established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) With a view to preventing such interference as aforesaid the licensee and any person acting on his behalf or by his permission shall comply with all directions which shall be given to the licensee by the Colonial Secretary with respect to avoiding interference between one wireless telegraph station and another.

(3) The licensed apparatus shall not without the consent in writing of the Colonial Secretary be altered in respect of any of the particulars mentioned in the Schedule hereto.

5.* (1) The licensee shall not (either by himself or by any person acting on his behalf or by his permission) by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with naval signalling.

(2) Whenever the operators at the station of the licensee perceive through the medium of the instruments used by them that naval signalling is proceeding they shall refrain from using the licensed apparatus until all indication that naval signalling is proceeding shall have ceased.

(3) The licensee and any person acting on his behalf or by his permission shall if so required in writing by the Colonial Secretary cease to use the licensed apparatus.

(4) If the Colonial Secretary is of opinion that the working of the licensed apparatus at the station specified in the Schedule hereto is inconsistent with the free use of naval signalling the licensee shall when required in writing by the Colonial Secretary close the said station.

(5) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this indenture.

6. Neither the licensee nor any person acting on his behalf or by his permission shall divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee or any such person as aforesaid and transmitted by naval signalling or by any

system of wireless telegraphy provided or maintained by the Government of the Colony.

7. The Colonial Secretary and his engineers and agents may from time to time and at all reasonable times enter upon the station or other premises in the possession or occupation of the licensee either solely or jointly with any other person or persons for the purpose of inspecting and may inspect any apparatus fixed or being in such places respectively and the licensee shall afford all requisite and proper facilities for such inspection and shall secure to the Colonial Secretary the right for the purpose aforesaid of entry from time to time into and on such station and premises as may be in the possession or occupation of any person or persons other than the licensee.

8. All apparatus used or intended to be used under this license shall be so erected fixed placed and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance working or user of any telegraphic line of the Colony.

9. If and whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by Wireless Telegraphy it shall be lawful for the Governor by warrant under his hand to direct and cause the licensed apparatus to be taken possession of in the name and on behalf of His Majesty.

10. The Colonial Secretary may at any time with the Governor's approval give notice in writing to determine these presents and the license or permission hereby given at the end of one calendar month from the date of such notice and at the expiration of that period the license or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Colonial Secretary under any covenant or provision herein contained on the part of the licensee to be observed and performed.

11. In case of any breach non-observance or non-performance by or on the part of the licensee of any of the covenants or conditions herein contained and on the part of the licensee to be observed and performed the Colonial Secretary may by writing revoke and determine these presents and the licence powers and authorities hereinbefore granted and each and every of them and thereupon these presents and the said licence powers and authorities and each and every of them shall absolutely cease determine and become void.

Provided always that no such revocation or determination as aforesaid shall prejudice or affect any right of action or remedy which shall have accrued or shall thereafter accrue to either of the parties hereto under the covenants herein contained.

12. Any notice request or consent (whether expressed to be in writing or not) to be given by the Colonial Secretary under these presents may be served by sending the same by registered post letter to the licensee and any notice to be given by the licensee under these presents may be served by sending the same by registered post letter addressed to the Colonial Secretary.

Signed on behalf of the Government of British Honduras

Acting Colonial Secretary.

Witness.

Signed by the licensee on behalf of

Belize, British Honduras.

Licensee.

Witness.

* This clause will be omitted in the case of inland installations.

THE SCHEDULE BEFORE REFERRED TO:—

Name of Station.	CHARACTER OF APPARATUS.		
	Maximum Range of Signalling with the Licensee's Own Apparatus.	Power (Current and Voltage).	Source of Power.
(1)	(2) — miles	(3) Current and Voltage ..	(4) Batteries.

BRITISH NORTH BORNEO

(See BORNEO, BRITISH.)

BRITISH SOMALILAND

THE Somali coast, lying south of the Red Sea, and stretching from Lahadu to Bandar Ziyava (49° east longitude), is administered by a British Commissioner. Egyptian control ceased in 1884, and the territory then fell under the administration of the Indian Government. It was taken over by the Foreign Office on October 1st, 1898, and was transferred to the Colonial Office on April 1st, 1905. The area comprises about 68,000 square miles, which support a population of about 300,000 Mohammedans, mainly nomadic, except on the coast, where British occupation has brought into existence some fair-sized towns supporting an urban population. The boundary has been settled by agreement between France, Italy, and Abyssinia. The chief ports are Berbera, Bulhar, and Zeila.

CONTROL.

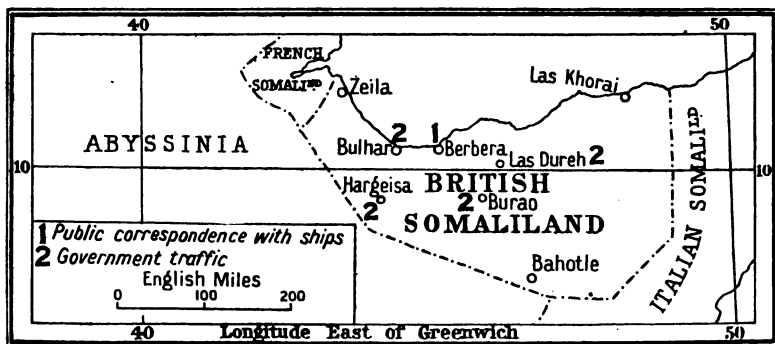
The control of wireless telegraph operations is vested in the Posts and Telegraphs Department.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

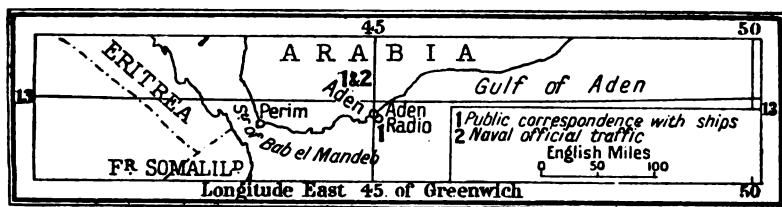
Official.	Title.	Address.
Mr. W. D. Lacey	Director, Posts and Telegraphs	Berbera.
Mr. C. V. Magill	Assistant Director of Posts and Telegraphs ..	Do.
Mr. A. J. S. Culpeper ..	Superintendent of Telegraphs	Do.
Mr. H. C. Johnson	Engineer	Do.

ORGANISATION.

Originally radiotelegraphy was introduced, and the Protectorate placed in telegraphic communication with the outside world, more with a view to administrative than commercial purposes. The first stations were erected in 1910 at Berbera and Aden (on the Asiatic coast), the latter being in telegraphic communication with the Eastern Telegraph Company's Aden Station.



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Subsequently other stations were erected, at Bulhar (1913), at Burao (1916), at Las Dureh (1918), and at Hargeisa (1919).

Burao is military headquarters, Las Dureh is an outpost station on the edge of Mulla's country and proved most useful by giving the camel corps information of a dervish raid which enabled the retreat to be cut off. Las Dureh communicates directly with Berbera and Burao.

A new station has been erected at Hargeisa, 110 miles S.W. of Berbera, for inferior working. Hargeisa is a District Commissioner's headquarters which is now in direct communication with Berbera and Burao.

Bulhar station has been temporarily closed.

Mobile stations are projected for Zeila and Las Khorai on the coast.

The latest available statistics enumerate: Six land stations (including Aden) (fixed) directly controlled by Government, and one portable land station (a $\frac{1}{2}$ kw. camel pack set) also under Government control. Internal communication is on a 900-metre wave to avoid interference in the Gulf of Aden.

ADMINISTRATION.

The first Ordinance to regulate radiotelegraphy in the Somaliland Protectorate was passed in 1908. It was called Ordinance No. 6 of 1908, and enacted that the full control of radiotelegraphy should be vested in the Commissioner, and any person contravening his regulations should be liable on conviction to a fine not exceeding £100 or imprisonment for 12 months, together with confiscation of his apparatus. A new Ordinance repealing the above was passed in 1913, and appears *in extenso* below. This constitutes the extant governing decree under which wireless is at present administered.

We append the text of the following:—

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations thereunder.

ORDINANCE.

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which messages or other communications are sent or received. Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Protectorate, except under and in accordance with a licence granted in that behalf by the Commissioner.

(2) Every such licence shall be in such form and for such period as the Commissioner may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Protectorate, otherwise than in accordance with regulations under this Ordinance.

5. (1) The Commissioner may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication have the same effect as if enacted in this Ordinance.

(2) The regulations in the schedule to this Ordinance shall have effect in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Commissioner, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Protectorate shall be subject to such further regulations as may be made by the Commissioner from time to time, and such regulations may prohibit or regulate such

use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the District Commissioner and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (i) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to fine not exceeding rupees seven hundred and fifty, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the District Court, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphs Ordinance, 1908, is hereby repealed.

SCHEDULE.—SECTION 5 (2).

REGULATIONS.

B i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Pro-

tectorate shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Protectorate or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless stations established on ships at sea.

ii. In these regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Protectorate, except with the special or general permission of the Commissioner.

iv. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

BULGARIA

(See map opposite.)

BULGARIA, which, until the advent of the late war, constituted one of the most important of the Balkan States, is still in so unsettled a state that it is not possible to give any particulars relating to wireless telegraphy, but it is hoped in our next issue that it may be possible to print the text of any laws or regulations governing the administration of wireless in that country.

CONTROL.

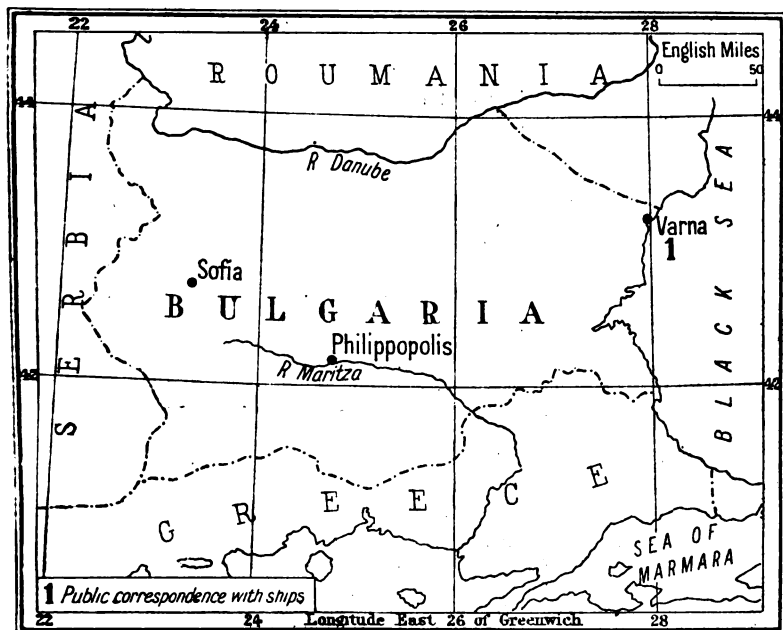
OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Nicholas Startcheff ..	Director General of Posts, Telegraphs and Telephones.	Sofia.

As far as is known only one fixed station exists, viz., at Varna, and this communicates with ships.

BURMA

(See INDIA.)



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CANADA

THE Dominion of Canada possesses a land area of 3,603,910 miles. It was originally discovered by Cabot, in 1497, then settled by the French in the seventeenth century, and finally annexed to the British Empire in 1763. Its establishment as a Dominion dates from July 1st, 1867. The executive power is vested in a Governor-General appointed by the Sovereign and aided by a Privy Council.

CONTROL.

The Marconi Company is the only commercial concern manufacturing and operating wireless telegraph apparatus in Canada.

Certain of the East Coast Stations which were taken over and operated by the Department for Naval Purposes during the war were handed back to the Marconi Wireless Telegraph Company on the following dates:—

North Sydney - December 5th, 1918 | Sable Island - January 14th, 1919
Camperdown - January 8th, 1919 | Cape Sable - April 1st, 1919

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
The Hon. Mr. C. C. Ballantyne ..	Minister of Marine and of the Naval Service	Department of Naval Service, Ottawa, Ont.
Mr. G. J. Desbarats, C.M.G. ..	Deputy Minister of the Naval Service	Department of Naval Service, Ottawa, Ont.
Lieut.-Commander C. P. Edwards, O.B.E.	Director, Government Radiotelegraph Service	Department of Naval Service, Ottawa, Ont.
Mr. W. A. Rush	Division Superintendent, Government Radiotelegraph Service	Department of Naval Service, Ottawa, Ont.
Mr. E. J. Haughton	Division Superintendent, Government Radiotelegraph Service	Department of Naval Service, Ottawa, Ont.
Mr. J. H. Thompson	Chief Engineer, Government Radio Telegraph Service	Department of Naval Service, Ottawa, Ont.

ORGANISATION.

According to the latest available information there are 563 radiotelegraph installations classified as follows :—

Coast Stations	44
Government Ship Stations	51
Licensed Ship Stations	145
Licensed Public Commercial Stations	2
Licensed Private Commercial Stations	11
Licensed Radiotelegraph Schools	17
Licensed Experimental Stations	9
Licensed Amateur Experimental Stations	281
Direction Finding Stations	3
Total	563

The first wireless station was erected by the Marconi Wireless Telegraph Company for the Government at Fame Point, Quebec. This station was erected in July, 1904, and during the same summer stations were erected at Heath Point, Anticosti, and Point Amour, Labrador, and on the Island of Belle Isle at the Atlantic entrance to the Straits of Belle Isle. The programme of construction was carried on almost without a break, and, as will be noted in the above table, there are now (excluding 3 Direction Finding Stations) 44 coast stations in Canada.

The Department requires that all those entering the Radiotelegraphic Service as operators should pass a proficiency examination to determine their qualifications prior to acceptance, and announces that applications for entry as operators in the Radiotelegraph Service should be addressed to—

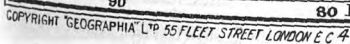
“ The Deputy Minister,
Naval Service Department,
Ottawa.”

All operators in the employment of the Department of the Naval Service who were enlisted in the R.N.C.V.R. during the late war, were demobilised on June 30th, 1919, on which date the Radiotelegraph Service reverted to a civilian basis.

ADMINISTRATION.

Radiotelegraphy in the Dominion was, until 1913, regulated by a section of the Telegraphs Act. This is now replaced by the Act which was assented to on June 6th, 1913, and revised in February, 1920. This is reprinted in the following pages. As matters at present stand, we may usefully divide the rules governing the administration and procedure as far as wireless telegraphy is concerned into the following :—

- A**—The Radiotelegraph Act, Chapter 43 of the 1913 Statute.
- B**—Regulations issued by the Governor-in-Council.
- C**—Regulations issued by the Minister of the Naval Service.
- D**—Extract from Air Regulations, 1919.
- E**—Limited coast station licence.
- F**—Public commercial licence.
- G**—Private commercial licence.
- H**—Experimental licence.
- I**—Amateur experimental licence.
- J**—Ship licence.
- K**—Training school licence.
- L**—Circular to shipmasters.



AN ACT RESPECTING RADIOTELEGRAPHY STATUTES, 1913, CHAPTER 43.

A His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. This Act may be cited as the Radiotelegraph Act.

2. In this Act, unless the context otherwise requires—

(a) "Minister" means the Minister of the Naval Service;

(b) "radiotelegraph" includes any wireless system for conveying electric signals or messages including radiotelephones;

(c) "coast station" means any radiotelegraph station which is established on land or on board a ship permanently moored and which is used for the exchange of messages and electric signals with ships at sea;

(d) "land station" means any radiotelegraph station or installation of radiotelegraphic apparatus which is not a coast station or a ship station;

(e) "ship station" means any radiotelegraph station established on board a ship which is not permanently moored.

3. No person shall establish any radiotelegraph station or instal or work any radiotelegraph apparatus in any place in Canada or on board any ship registered in Canada except under and in accordance with a licence granted in that behalf by the Minister.

4. From and after the first day of January, nineteen hundred and fourteen, no passenger steamer, whether registered in Canada or not—

(a) licensed to carry fifty or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than two hundred nautical miles from one port or place to another port or place; or,

(b) licensed to carry two hundred and fifty or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than ninety nautical miles from one port or place to another port or place; or,

(c) licensed to carry five hundred or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than twenty nautical miles from one port or place to another port or place

shall leave or attempt to leave any Canadian port unless such steamer is equipped with an efficient radiotelegraph apparatus, in good working order, capable of transmitting and receiving messages over a distance of at least one hundred nautical miles by night and by day, and in charge of a person fully qualified to take charge of and operate such apparatus.

2. The owner, master or other person in charge of any passenger steamer which leaves or attempts to leave any Canadian port contrary to the provisions of this section shall, on summary conviction, be liable to a fine not exceeding one thousand dollars and costs, and such fine and costs shall constitute a lien upon such passenger steamer.

(3) This section shall not apply to passenger steamers plying on the rivers of Canada, including the River St. Lawrence as far seaward as a line drawn from Father Point to Point Orient, or on the Northumberland Straits, or on the Georgian Bay, or on the lakes of Canada other

than Lakes Ontario, Erie, Huron and Superior, and the provisions of paragraph (c) of sub-section 1 of this section shall not apply to steamers making voyages on Lakes Ontario, Erie, Huron and Superior, the regular route for which is not at any point more than seven miles from the shore.

(4) This section shall not apply to steamers calling at Canadian ports solely for the purpose of obtaining bunker coal or provisions for the use of such steamer, or through stress of weather, or for repairs.

5. All persons operating land or cable telegraph lines shall transmit all messages destined to or coming from ship stations via coast stations under such rules as may be made by the Board of Railway Commissioners for Canada.

6. No one shall be employed as a radiotelegraph operator at any coast or land station unless he is a British subject, and all radiotelegraph operators at shore or land stations, or on ship stations on board any vessel registered in Canada, shall take and subscribe a Declaration of Secrecy in the form set forth in the Schedule to this Act, before a judge of any court, a notary public, a justice of the peace or a commissioner for taking affidavits, having authority or jurisdiction within the place where the oath is administered.

(2) Every person who has made the Declaration of Secrecy and who, either directly or indirectly, divulges to any person, except when lawfully authorised or directed so to do, any information which he acquired by virtue of his employment, is guilty of an offence and shall be liable on summary conviction to a penalty not exceeding one hundred dollars and to imprisonment for a term not exceeding six months.

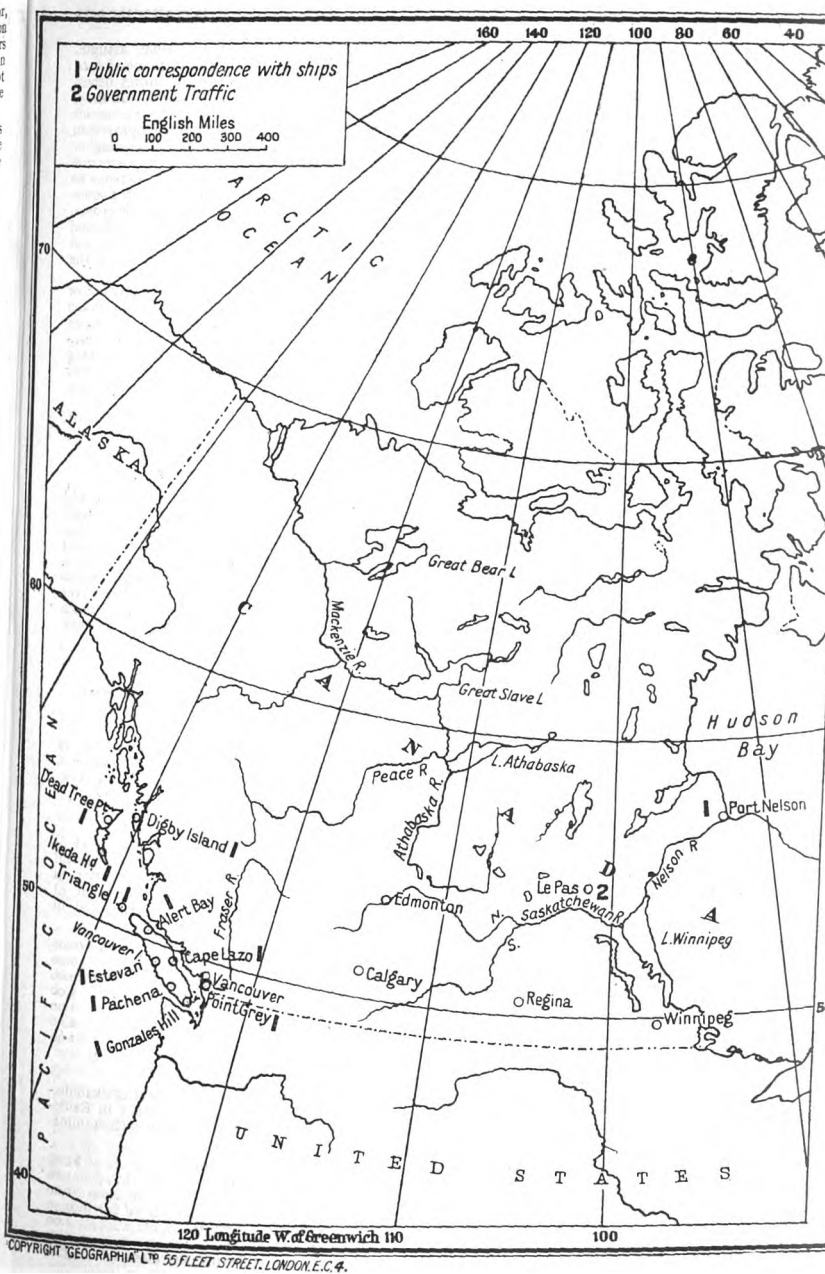
7. Any person who sends or transmits or causes to be sent or transmitted any false or fraudulent distress signal, message, call or radiogram of any kind, or who without lawful excuse interferes with or obstructs any radio-communication, shall be guilty of an offence and shall be liable on summary conviction to a penalty not exceeding five hundred dollars and costs or six months' imprisonment.

8. If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a radiotelegraph station has been established without licence in that behalf, or that any apparatus for radiotelegraphy has been installed or worked in any place or on board any ship registered in Canada within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Minister and named in the warrant.

(2) A warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any radiotelegraph apparatus which appears to him to be there used or intended to be there used for radiotelegraphy.

9. Every one who establishes a radiotelegraph station or installs or works any radiotelegraph apparatus in violation of the provisions of this Act, or of any regulation made hereunder, shall be liable on summary conviction to a penalty not exceeding fifty dollars, and on conviction on indictment to a fine not exceeding five hundred dollars and to imprisonment for a term not exceeding twelve months, and in either case shall be liable to forfeit to His Majesty, any radiotelegraph apparatus installed or worked without a licence.

(2) No proceedings shall be taken against any



person under this section, except by order of the Minister.

10. The Governor in Council may—

(a) prescribe the tariff of fees to be paid for licences and for examination for certificates of proficiency held and issued under the provisions of this Act;

(b) accede to any international convention in connection with radiotelegraphy, and make such regulations as may be necessary to carry out and make effective the terms of such convention and prescribe penalties recoverable on summary conviction for the violation of such regulations; provided that such penalties shall not exceed five hundred dollars and costs;

(c) make regulations for the censorship and controlling of radiotelegraph signals and messages in case of actual or apprehended war, rebellion, riot or other emergency.

11. The Minister may make regulations—

(a) prescribing the form and manner in which applications for licences under this Act are to be made;

(b) classifying ship, coast and land stations and prescribing the type and range of the regular equipment and the emergency equipment to be installed in the several classes of stations;

(c) defining the different kinds of licences that may be issued, their respective forms and the several periods for which they shall continue in force;

(d) prescribing the conditions and restrictions to which the several licences shall respectively be subject;

(e) prescribing the different classes of certificate of proficiency and the class of certificate necessary to qualify persons as operators for the several classes of ship, coast and land stations;

(f) for the examination of persons desiring to obtain certificates of proficiency as radiotelegraph operators and to determine the qualifications in respect of age, term of service, skill, character and otherwise to be required for such certificates;

(g) prescribing the watches to be kept by operators and the number of operators to be maintained and kept at the different classes of ship, coast and land stations;

(h) for the inspection of radiotelegraph stations;

(i) to provide how radiotelegraph apparatus installed upon any foreign or British ship (whether such British ship is registered in Canada or elsewhere) shall be operated while such ship is within the territorial waters of Canada;

(j) to compel all radiotelegraph stations to receive, accept, exchange and transmit signals and messages with such other radiotelegraph stations and in such manner as he may prescribe

(k) for the effective carrying out of the provisions of this Act.

(2) The Minister may, by regulation, authorise the imposition of a penalty not exceeding fifty dollars and costs or three months' imprisonment for the violation of any regulation made under this section, and any such penalty may be recovered upon summary conviction.

12. All regulations made under the provisions of the two sections immediately preceding shall be published in *The Canada Gazette*, and shall be laid before both Houses of Parliament within ten days after the publication thereof if Parliament is then sitting, and if Parliament is not

then sitting, then within ten days after the next meeting thereof.

13. His Majesty may, at any time, assume, and for any length of time retain, possession of any radiograph station and of all things necessary to the sufficient working thereof, and may, for the same time, require the exclusive service of the operators and other persons employed in working the same; and the person owning or controlling the station shall give up possession thereof, and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders, and transmit and receive such signals, calls and radiograms as they are required to receive and transmit by any duly authorised officer of the Government of Canada.

(2) If the Minister and the person owning or controlling any radiotelegraphic station taken possession of by the Crown under the provisions of this section cannot agree as to the compensation to be paid by the Crown for such taking possession, the Minister shall refer the matter to the Exchequer Court of Canada for adjudication.

14. Part IV of the Telegraphs Act is repealed.

SCHEDULE.

DECLARATION OF SECRECY.

I, A. B. solemnly and sincerely promise and declare that I will faithfully and honestly fulfil the duties which devolve upon me as radiotelegraphic operator, and that I will not, either directly or indirectly, divulge to any person, except when lawfully authorised or directed so to do, any information which I acquire by virtue of my employment as such operator, or which may come to my knowledge through the operation of any radiotelegraphic installation.

Declared before me at

this day of 19 [Signature of declarant.]

REGULATIONS.

B APPROVED BY THE GOVERNOR IN COUNCIL AND ISSUED IN ACCORDANCE WITH SECTION 10 OF THE RADIOTELEGRAPH ACT, CHAPTER 43, STATUTES, 1913.

FEES FOR LICENCES.

1. The annual fees to be paid in respect of licences issued by the Minister of the Naval Service, for the installation and operation of radiotelegraph stations in the Dominion of Canada, or on board any ship registered in Canada, shall be as follows:—

1. Limited Coast stations	\$10.00
2. Public Commercial stations	50.00
3. Private Commercial stations	10.00
4. Experimental stations	5.00
5. Amateur Experimental stations	1.00
6. Technical or Training School stations	1.00
7. Ship stations	1.00

FEES FOR EXAMINATIONS.

2. The fees to be paid in respect of examinations for "Certificates of Proficiency in Radiotelegraphy" shall be as follows, for each examination or re-examination:—

1. Extra First-class certificate	\$1.00
2. First-class certificate	1.00
3. Second-class certificate	1.00
4. Third-class certificate	0.50
5. Experimental certificate	1.00
6. Amateur certificate	Nil.
7. Emergency certificates, any class	5.00

LONDON CONVENTION.

3. (i) The provisions of the International Radiotelegraph Convention of London, 1912, and of the regulations annexed thereto, shall be observed by all "coast stations" established in Canada, and by all "ship stations" on board any vessel registered in Canada.

(ii) *Penalty.*—Any person who installs or works any radiotelegraph apparatus at any of the above-mentioned stations in violation of this regulation, shall be liable on summary conviction to a fine not exceeding five hundred dollars (\$500) and costs.

CONTROL OF STATIONS IN CASE OF EMERGENCY.

4. (i) *Coast and Land Stations.*—If, and whenever in the opinion of the Minister an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the apparatus of any coast or land station, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause so much of the apparatus, as is within Canada or the territorial waters thereof, or any part of the apparatus, to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and subject thereto for such ordinary services as to the said Minister may seem fit, and in that event, any person, authorised by the said Minister, may enter upon the stations, offices and works of any coast or land station or any of them and take possession thereof and use the same as aforesaid.

(ii) The Minister may, when he considers such an emergency as aforesaid to have arisen, instead of taking possession of such coast or land station, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly and in such manner as he may direct, and such persons may enter upon the station premises accordingly, or the said Minister may direct the owner or his representative to submit to him or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

(iii) The Minister may, when he considers such emergency as aforesaid to have arisen, close any coast or land station and cause the removal therefrom of the apparatus or any part thereof.

5. (i) *Ship Stations.*—If, and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient for the Public Service that the Government shall have control over the transmission of messages by the apparatus of a radiotelegraph station on board any Canadian registered vessel, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause the apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and, subject thereto, for such ordinary services as to the said Minister may seem fit, and in that event, any person authorised by the said Minister may enter upon any ship station and take possession thereof and use the same as aforesaid.

(ii) When the Minister considers such an emergency as aforesaid to have arisen, he may,

instead of taking possession of such ship station, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly, and in such manner as he may direct, and such persons may enter upon the station premises accordingly or the said Minister may direct the owner or his representative to submit to him or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

NAVAL MINISTER'S REGULATIONS.

C ISSUED BY THE MINISTER OF THE NAVAL SERVICE IN ACCORDANCE WITH SECTION II OF THE RADIOTELEGRAPH ACT, CHAPTER 43, STATUTES 1913.

LICENCES.

1. *Application for Licence.*—Application for licences to instal and operate radiotelegraph equipments at any point in the Dominion of Canada or on board any ship registered therein, must be made to the Deputy Minister of the Department of the Naval Service, Ottawa, on the "Application for Licence" form, provided for that purpose, copies of which may be obtained on application to the above-mentioned Department.

2. *Classes of Licences.*—The following classes of licences will be issued:—

COAST STATIONS—

1. Limited Coast station.

LAND STATIONS—

2. Public Commercial station.
3. Private Commercial station.
4. Experimental station.
5. Amateur Experimental station.
6. Technical or Training School station.

SHIP STATIONS—

7. Ship station.

3. *Duration of Licences.*—Licences will be valid for one year, commencing on April 1st and expiring on March 31st of the following year. All licences issued during the year automatically expire on March 31st, unless otherwise specified in the licence.

4. *Limited Coast Licences.*—Limited coast licences will only be granted with respect to stations in localities not served by a regular Government coast station; such stations will be allowed to undertake a limited correspondence with ships at sea determined by the object of such correspondence. They must exchange public messages with such ship, coast and land stations as are designated in the licence, but with no other stations whatsoever.

For ship to shore working they must be operated in accordance with the provisions of the International Radiotelegraph Convention, and they must employ such wavelengths below 600 metres or above 1,600 metres as are specified in the licence.

The watches to be maintained and the number and class of operators to be carried are to be as specified in the licence, the regular form of which is annexed hereto. (Form No. W. 42.)

5. *Public Commercial Licences.*—Public commercial licences will be granted to land stations

open for public correspondence with certain other land stations designated in the licence, and may use such wave-lengths, within the following limits, as are specified therein:—

Below 200 metres.

" 450 "

Above 1,900 "

The watches to be maintained and the number and class of the operators to be carried are to be as specified in the licence, the regular form of which is annexed hereto. (Form No. W. 18.)

"6. (i) *Private Commercial Licences*.—Private commercial licences will be granted to land stations to be operated in connection with the private correspondence of the licensee. Such stations will be limited to certain specific services which will be defined in the licence. Such stations shall not exchange messages with stations other than those specified in the licence, and except in the special case provided for in Section 2 of this Regulation, no tolls shall be levied or collected on account of any business transacted, or messages sent to or from the station. This class of station may use such wavelengths, within the limits prescribed, in Regulation No. 5, as are specified in the licence. The watches to be maintained and the number and class of operators to be carried shall be as specified in the licence, the regular form of which is annexed hereto. (Form No. 43.)

(ii) In the case of private commercial stations established at points not provided with any other means of rapid communication, such as telegraph or telephone, or in the case of interruption to such service, the Minister may prescribe that the licensed station must accept messages to and from the public, and communicate with such stations as may be designated. In this event, the licensee shall be entitled to collect a toll for the handling of such public correspondence, the amount of such toll to be as approved by the Board of Railway Commissioners and as specified in the licence.

(iii) The Minister at his discretion may authorise the licensed station to communicate with certain specified ship stations when such ship stations are within certain areas or localities to be specified in the licence. Messages handled with such ships must be limited exclusively to the business of the licensee, no coast station charge shall be levied in respect of such message."

7. *Experimental Licences*.—Experimental licences will be granted to stations intended for experimental purposes and operated with a view to the advancement of the art of radiotelegraphy. Applicants for such licences must state their technical attainments and the general lines on which they propose to pursue their investigations. It should be observed that the fact that the applicant desires to conduct experiments with his equipment does not justify or require a licence of this class, as most experiments can be conducted under the "Amateur Experimental Licence" by the use of an artificial aerial.

In addition to the provisions contained in the regular form of experimental licence annexed hereto (Form No. W. 20), the following special regulations will apply to all experimental stations.

SPECIAL REGULATIONS FOR EXPERIMENTAL STATIONS.

8. Applicants for an experimental licence must state in their application what wave-

length they desire to use; the following lengths being available—

Below 200 metres.

" 450 "

Above 1,900 "

In special cases and for short periods the Minister shall have power to permit the use of 300, 600 and 1,800 metres for the purpose of testing or demonstrating commercial apparatus, such permission to be given by letter under his hand.

9. The station is strictly limited to the use of such wavelength or wavelengths as are specified in the licence.

10. When transmitting on wavelengths of 100 metres or less the station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97), and when transmitting on wavelengths greater than 100 metres it must, if it be within the range of any commercial or coast station, be worked by a person holding either a "First-class," "Second-class," or "Experimental" certificate of proficiency in radiotelegraphy. (See Regulations Nos. 93, 94 and 96.)

11. The power used, measured at the terminals of the transformer, must not exceed $\frac{1}{2}$ kw.

In special cases, however, such as that of a commercial company desirous of testing and demonstrating apparatus, or stations so far removed from any commercial station or route of navigation as to preclude any possibility of interference, the Minister may at his discretion permit the use of greater powers than $\frac{1}{2}$ kw.

12. The waves omitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of five per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

13. A distinctive call signal will be allotted to each station, commencing with a figure, e.g., 3 A A, etc., which signal shall be sent not less than three times at the termination of every transmission.

14. The regulations of the International Radiotelegraph Convention must, where applicable, be observed at the station.

15. The station, when operating, must listen for the signal "STP" which will indicate that an experimental station is interfering with commercial business.

The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, experimental stations will absolutely cease to operate until the Government station gives the signal "Cancel STP."

16. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised, the aerial must be disconnected.

17. When the licensed station is in the vicinity of a commercial station it should be connected with the local telephone exchange so

that instant communication may be established in case of interference.

18. *Amateur Experimental Licences.*—Amateur experimental licences will be granted to small stations used for instruction, experimental purposes, or amusement by persons relatively inexperienced in operating.

In addition to the provisions contained in the regular form of amateur experimental licence annexed hereto (Form No. W. 44), the following special regulations will apply to all amateur experimental stations.

SPECIAL REGULATIONS FOR AMATEUR EXPERIMENTAL STATIONS.

19. At amateur experimental stations the power used measured at the terminals of the transformer must not exceed $\frac{1}{2}$ kw.

20. The wavelengths which may be used vary with the distance between the licensed station and any commercial coast or land station or a route of navigation as follows:—

For Transmission—

Class 1.—Stations located within 5 miles of a commercial coast or land station or a route of navigation, shall not use a transmitting wavelength greater than 50 metres;

Class 2.—Stations located more than 5 but less than 25 miles from a commercial coast or land station or a route of navigation, shall not use a transmitting wavelength greater than 100 metres;

Class 3.—Stations located more than 25 but less than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wavelength greater than 150 metres;

Class 4.—Stations located more than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wavelength greater than 200 metres.

21. In cases where transmitting apparatus is installed the natural wavelength of the aerial and the length of the emitted waves must be as specified in the licence; in general this wavelength will be the maximum allowable under Regulation No. 20.

22. In cases where no transmitting apparatus is installed on the station, no limit is placed on the length of the aerial which may be used provided it is employed for the purpose of reception only.

23. The station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97).

24. The waves emitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

25. A distinctive call signal will be allotted to each station, commencing with a figure, e.g., 3 A, etc., which signal must be sent not less than three times at the termination of every transmission.

26. The regulations of the International Radiotelegraph Convention must, where applicable, be observed by the station.

27. The station must take every precaution to prevent interference with the working of other stations.

28. The station, when operating, must listen or the signal "STP" which will indicate that

an amateur experimental station is interfering with commercial business.

29. The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the amateur experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, all amateur experimental stations will cease to operate until the Government station gives the signal "Cancel STP."

30. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised, the aerial must be disconnected.

31. When the licensed station is in the vicinity of a commercial station it should be connected with the local telephone exchange so that instant communication may be established in case of interference.

32. *Technical and Training School Licences.*—Technical and training school licences will be granted to stations intended for educational purposes; they will be afforded every facility for the work they propose to undertake compatible with any special local conditions such as the existence of a commercial or coast station in their vicinity; in general they will be subject to the same conditions as amateur experimental and experimental stations.

33. *Ship Station Licences.*—Ship station licences will be granted to stations on British ships registered in Canada.

The regular form of the licence is annexed hereto. (Form No. W. 19.)

CLASSIFICATION OF SHIP STATIONS.

Ship Stations will be classified as follows:—

34. *Class 1.*—All "sea-going" passenger vessels registered in Canada with an average speed of 15 knots or more, carrying 50 or more persons and plying between ports more than 200 miles apart; also all "sea-going" passenger vessels registered in Canada with an average speed of 13 knots or more, carrying 200 or more persons and plying between ports more than 500 miles apart.

35. *Class 2a.*—All "sea-going" passenger vessels registered in Canada affected by the provisions of Section 4 of the Radiotelegraph Act, which do not come under Class 1.

Class 2b.—All vessels registered in Canada plying on "coasting voyages" or on the "inland waters" of Canada which are affected by the provisions of Section 4 of the Radiotelegraph Act.

36. *Class 3.*—All vessels registered in Canada not affected by the provisions of Section 4 of the Radiotelegraph Act, but which have been voluntarily equipped with radiotelegraph apparatus.

The terms "sea-going," "coasting voyage," and "inland waters" are to be as defined in Section 72 of the Canada Shipping Act, Chapter 113, R.S. 1906.

REGULAR EQUIPMENT.

37. *Vessels in Class 1.*—The regular radiotelegraph equipment must have a minimum range of 100 nautical miles at all hours of the day and night with a similar equipment, on a similar vessel and with all Canadian Government coast stations.

38. The normal wavelength of the emitted wave must be 600 metres; in addition the set must be capable of being operated on a wavelength of 300 metres, and means are to be provided whereby a quick change-over from one wavelength to the other may be effected.

39. In the case of small vessels on which it is materially impossible to use a transmitting wavelength of 600 metres, 300 metres may be employed; such ship stations, however, must be fitted with a receiver capable of tuning up to a 600 metre wavelength and the watches must be maintained on that wavelength.

40. The logarithmic decrement of a complete oscillation must not exceed two-tenths (0.2).

41. The power used by the transmitter, measured at the terminals of the generator of the station, must not, under normal circumstances, exceed 1 kw., except in the special case provided for in Article 35, paragraph 2, of the International Radiotelegraph Convention of London, 1912.

42. In the case of equipments using a power of more than 50 watts, an arrangement must be provided whereby several ranges, each less than the normal range, may be speedily obtained, the shortest range being, approximately, 15 nautical miles.

43. The use of "plain aerial" except in cases of distress or in installations using a power of less than 50 watts, is prohibited.

44. *Vessels in Class 2.*—Regulations No. 37 to No. 43, inclusive, shall apply to the equipments on vessels in Classes 2a and 2b.

45. *Vessels in Class 3.*—Regulations No. 38 to No. 43, inclusive, shall apply to equipments on vessels in Class 3.

EMERGENCY EQUIPMENTS.

46. *Class 1.*—Every vessel in Class 1 must carry an emergency source of power, instantly available, which shall be capable of operating the equipment for six hours, under normal conditions, with a minimum range of 80 nautical miles.

47. *Class 2.*—Vessels in Classes 2a and 2b must carry a similar source of power with the exception that the minimum normal range of the equipment is reduced to 50 nautical miles.

48. *Class 3.*—Vessels in Class 3 will not be required to carry emergency sets.

49. *Emergency Equipments Generally.*—(1) The emergency equipment in its entirety must in all cases be placed in the upper part of the ship, as high as practicably possible and in a position of the greatest safety.

(2) The emergency equipment may take the form of complete transmitter. Storage battery sets, of sufficient capacity to operate the regular radiotelegraph equipment of the vessel for the specified time, are, however, strongly recommended.

(3) A plain aerial transmitter may be installed as an emergency equipment, provided (subject to the provisions of Regulation No. 43) the use of the same is confined exclusively to distress calls.

(4) Regulations No. 46 to No. 49, inclusive, will become effective on and after December 1st, 1914.

50. *Spare Parts.*—Every ship station shall carry a reasonable number of spares of such parts of both the main and emergency radiotelegraph equipment as are subject to undue wear, deterioration, or liability to accident.

51. *Certificate of Inspection.*—The radiotelegraph installation on all British vessels registered

in Canada will be subject to inspection by an officer of the Department of the Naval Service at least once a year, who, if the apparatus is found to comply with the terms of the Radiotelegraph Act and the regulations issued thereunder, shall issue to the vessel a "Radiotelegraph Inspection Certificate" certifying that the equipment has been duly inspected and that it complies with the provisions of the licence issued therefor by the Minister of the Naval Service, such certificate to be posted in the radiotelegraph cabin.

52. *Time.*—Radiotelegraph stations on vessels plying on the West Coast shall observe Pacific time, and those on the Great Lakes and East Coast Eastern Standard time.

WATCHES.

53. *Vessels in Class 1.*—A constant watch must be maintained at the radiotelegraph stations on all vessels in Class 1 (Regulation No. 34) whilst they are en route, and two operators, holding first-class certificates, must be carried on such vessels.

54. *Vessels in Class 2a.*—A constant watch from 8 a.m. to 3 p.m. and a watch during the first ten minutes of every other hour of the day must be maintained at the radiotelegraph stations on all vessels in Class 2a (Regulation No. 35) whilst they are en route; the ten-minute watch may be maintained by an operator holding a "Second-class Certificate of Proficiency," or by a person holding a regular "Third-class Certificate."

55. *Vessels in Class 2b.*—Watches as herein-after specified in Regulations No. 57 to No. 67, must be maintained at the radiotelegraph stations on all vessels in Class 2b, whilst they are en route.

56. (1) *Vessels in Class 3.*—No fixed watches need be maintained at radiotelegraph stations on vessels in Class 3 (Regulations No. 36) when plying on a coasting voyage or on the Great Lakes on the runs specified in Regulations 57 to 62.

(2) Vessels in Class 3 plying on transoceanic voyages, and carrying one operator, must keep watches as specified in Regulation 56a.

56a. Vessels carrying one operator, and plying on runs not covered by Sections 57 to 62, must whilst en route maintain watches as follows:—

Belt A.—East Atlantic and European.

From Long. 30° W. to Long. 30° E., including Baltic, Mediterranean and Black Seas.

0800 to 1000
1200 to 1400
1600 to 1800
2000 to 2200 G.M.T.

Belt B.—Indian Ocean.

From Long. 30° E. to Long. 90° E., including Red Sea and Persian Gulf.

0000 to 0200
1200 to 1400
1600 to 1800
2000 to 2200 G.M.T.

Belt C.—Australasian (Western).

From Long. 90° E. to Long. 160° E.

0000 to 0200
0400 to 0600
1200 to 1400
2000 to 2200

Belt D.—Australasian (Eastern).

From Long. 160° E. to Long. 140° W.

0000 to 0200
0400 to 0600
0800 to 1000
2000 to 2200 G.M.T.

Belt E.—East Pacific.

From Long. 140° W. to the Western Coast of America, thence southward along Long. 70° W.
0000 to 0200
0400 to 0600
1600 to 1800
2000 to 2200 G.M.T.

Belt F.—West Atlantic.

From Eastern Coast of America, and Long. 70° W. (South of Cape Horn) to Long. 30° W.
0000 to 0200
1200 to 1400
1600 to 1800
2000 to 2200 G.M.T.

PACIFIC COAST.

57. Class 2b—Local Coasting Runs.—Vessels in Class 2b, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and not steaming for more than 16 hours in any day, must, whilst en route, maintain watches during the following periods:—

7.30 a.m. to 8.00 a.m. and the last half-hour of every hour until 8.00 p.m.
9.30 p.m. to 10.00 p.m.
11.30 p.m. to 12.00 midnight.
3.30 a.m. to 4.00 a.m.
5.30 a.m. to 6.00 a.m.

In the case of vessels affected by Sub-section (c) of Section 4 of the Radiotelegraph Act (500 persons)—ports more than 20 miles apart, the above watches need only be kept whilst the boats are en route between ports more than 20 miles apart.

58. Vessels in Class 2b, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and steaming for more than 16 hours in any one day, must, whilst en route, maintain watches as prescribed in Regulation No. 57, with the exception that a watch may be maintained from 1.30 a.m. to 2.00 a.m. instead of from 3.30 a.m. to 4.00 a.m., and no watch need be kept between the hours of 2.00 a.m. and 9.30 a.m.

59. Class 2b—Coasting Vessels Plying North and South.—Vessels in Class 2b plying on runs between ports in British Columbia south of Queen Charlotte Sound and ports in the same province north of that Sound, or *vice versa*, must, whilst en route, maintain watches during the following periods:—

7.30 a.m. to 8.00 a.m.
10.30 a.m. to 11.00 a.m.
1.30 p.m. to 2.00 p.m.
4.30 p.m. to 5.00 p.m.
7.30 p.m. to 8.00 p.m.
10.30 p.m. to 11.00 p.m.

If, during these periods, the vessel is in the immediate vicinity of any place mentioned in the lists given in Regulations 60 and 61, communication must be established with the coast station shown, or should the vessel reach such vicinity out of the above periods the ship station must call such coast station until communication is established or it becomes out of range.

60. North Bound:—

LOCALITY.

Station.	Day Time. Between 7.30 a.m. and 11 p.m.		Night Time. Between 11 p.m. and 7.30 a.m.	
Gonzales Hill	Trial Island		Trial Island	
Point Grey	The First Narrows or Abeam		The First Narrows or Abeam	
Cape Iazo	Porlier Pass		Porlier Pass.	
Cape Mudge	Abeam		Cape Mudge.	
Alert Bay	Cape Mudge			
"	Blinkensop Bay		Abeam.	
"	Abeam		Pine Island.	
"	Pine Island			
Triangle Island	Egg Island		Egg Island.	
"	Before reaching Harold Point		Before reaching Harold Point.	
"	Ivory Island.		Ivory Island.	
Digby Island	Vancouver Rock			
"	Watson Rock		Watson Rock.	
"	Abeam		Abeam.	
"	Hodgson Island			
"	Pointers		Pointers.	

61. South Bound :—

Station.	LOCALITY.	
	Day Time. Between 7.30 a.m. and 11 p.m.	Night Time. Between 11 p.m. and 7.30 a.m.
Digby Island	Pointers	Pointers.
"	Hodgson Island	Abeam.
"	Abeam	"
"	"	Lawyer Island.
Triangle Island	Lawyer Island	Vancouver Rock.
"	Vancouver Rock	"
"	Ivory Island	Harold Point.
"	Harold Point	Egg Island.
"	Egg Island	Pine Island.
"	Pine Island	"
Alert Bay	Abeam	"
"	Blinkensop Bay	Blinkensop Bay.
Cape Lazo	Chatham Point	"
"	Abeam	Abeam.
Point Grey	Sisters	Sisters.
"	Abeam	Abeam.
Gonzales Hill	Active Pass	Active Pass.

GREAT LAKES AND EAST COAST.

62. *Class 2b—Vessels Plying on the Great Lakes and on Coasting Voyages on the East Coast.*—Vessels in Class 2b plying on voyages of more than 300 miles between terminal ports on the Great Lakes or East Coast must maintain watches whilst en route as follows :—

7.00 a.m. to 7.30 a.m.

10.00 a.m. to 10.30 a.m.

1.00 p.m. to 1.30 p.m.

4.00 p.m. to 4.30 p.m.

7.00 p.m. to 7.30 p.m.

10.00 p.m. to 10.30 p.m.

Communication must also be established with each coast station when abeam, irrespective of whether such position is reached during the above periods or not.

63. Vessels in Class 2b, plying on voyages of less than 300 miles but more than 50 miles between terminal ports and not steaming for more than 16 hours out of the 24, must maintain watches whilst en route as follows :—

8.00 a.m. to 8.30 a.m. and the first half-hour of every hour until 8.30 p.m.

10.00 p.m. to 10.30 p.m.

12.00 p.m. to 12.30 p.m.

4.00 a.m. to 4.30 a.m.

6.00 a.m. to 6.30 a.m.

64. Vessels in Class 2b, plying on voyages of less than 300 miles but more than 50 miles between ports and steaming for more than 16 hours in any one day, must, whilst en route, maintain watches as prescribed in Regulation No. 63, with the exception that 2.00 a.m. to 2.30 a.m. is substituted for 4.00 a.m. to 4.30 a.m., and no watch need be kept between the hours of 2.30 a.m. and 10.00 a.m.

66. Vessels in Class 2b plying on voyages of less than 50 miles between terminal ports and not steaming more than 10 hours out of the 24 must, whilst en route, maintain a constant watch.

67. Vessels in Class 2b plying on voyages of less than 50 miles between terminal ports and steaming for more than 10 hours in the 24 must, whilst en route, maintain watches as prescribed in Regulation No. 64.

OPERATION.

68. *Power Available.*—Power for the operation of the main equipment shall be available during the periods a watch is being maintained under Regulations No. 53 to No. 67.

69. *Control of Ship Stations.*—The operation of the radiotelegraph station on any vessel shall be under the supreme control of the master of such vessel.

70. *Censorship by the Master of a Vessel.*—The master of a vessel shall have the right to censor all messages addressed to or transmitted by a radiotelegraph station on board his vessel, but such master shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message coming to his knowledge through the exercise of such censorship, nor shall the master or any operator divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message (other than a message of distress) coming to his knowledge and not intended for the said station.

71. *Form W. 40.*—A copy of Form W. 40 must be posted in every radiotelegraph station; these forms may be obtained from the Deputy Minister of the Naval Service on request.

72. *Secrecy of Messages.*—No message shall be delivered, or its contents divulged, to any person except the addressee, his or her accredited agent, or such properly authorised persons as are essential for the forwarding of such message to its destination.

73. *Superfluous Signals.*—The transmission of superfluous signals by any ship or coast station is absolutely prohibited; trials and practices are forbidden except under such circumstances as to preclude the possibility of interference with other stations.

74. *Profane Language.*—No person shall transmit or make a signal containing profane words or language.

OPERATORS.

75. *Operators.*—The apparatus of all coast,

land or ship stations must only be worked by persons holding regular Certificates of Proficiency in Radiotelegraphy, and who have subscribed to a Declaration of Secrecy, as prescribed in Section 6 of The Radiotelegraph Act.

76. British Subjects.—ALL OPERATORS on coast, ship or land stations must (subject to the provisions of Regulation No. 88) be British subjects, and the different classes of stations must be worked by operators holding Canadian "Certificates of Proficiency" (subject to the provisions of Section 77) not inferior to those hereinafter specified in Regulations No. 80 to 86, for the respective classes of stations.

77. Ship Stations.—The holders of Certificates of Proficiency in Radiotelegraphy issued in accordance with the provisions of the International Radiotelegraph Convention by His Majesty's Postmaster-General, the Administration of any British self-governing Dominion or Colony, or the Government of India, will (subject to the provisions of these regulations) be entitled to act as radiotelegraph operators on any Canadian vessels.

78. Certificates of Proficiency.—The following Certificates of Proficiency in Radiotelegraphy are issued by the Department.

Ship Stations—

- (1) First-class Certificate.
- (2) Second-class Certificate.
- (3) Third-class (Watcher's) Certificate.
- (4) Emergency Certificate.

Land and Coast Stations—

- (5) Extra First-class Certificate.
- (6) First-class Certificate.
- (7) Second-class Certificate.
- (8) Third-class (Water's) Certificate.
- (9) Emergency Certificate.
- (10) Experimental Certificate.
- (11) Amateur Experimental Certificate.

79. Emergency Certificates.—In case of emergency in which it is impossible for an operator to attend a regular examination, the Minister may hold an emergency examination and shall have power to issue emergency certificates of any class. Such certificates shall not be valid for more than six months.

Any person holding an emergency certificate of proficiency must promptly apply for permission to attend an examination as provided by Regulation 87, and when notified of the date and place of examination he is hereby further required to attend a regular examination for a certificate of proficiency within the requirements of Regulations 89 to 97 inclusive, and the said emergency certificate shall expire and cease to be of effect on the day on which the result of such regular examination is published.

OPERATORS TO BE CARRIED.

80. Ships in Class 1.—Ships in Class 1 must carry two operators holding First-class Certificates.

81. Ships in Class 2a.—Ships in Class 2a must carry two operators, one First-class and one Second-class, or one First-class and one Third-class.

82. Ships in Class 2b.—Ships in Class 2b must carry one First-class operator.

83. Ships in Class 3.—Ships in Class 3, if they undertake public correspondence, must carry one First-class operator or, if their service is limited exclusively to the ship's business, one Second-class operator.

84. Coast Stations.—(1) All public coast stations open for public correspondence and maintaining a constant watch must carry

three operators, each of whom must hold a Canadian First-class Certificate of Proficiency. The Minister shall, however, have power in special cases to permit the employment of other persons on such stations for the purpose of maintaining the constant watch above mentioned, provided such persons are capable of transmitting and receiving in the Morse Code at a speed of twenty words a minute, as prescribed in Sub-sections (a) and (b) of Regulation No. 89 and provided the station is in charge of an operator holding a First-class Certificate of Proficiency.

(2) This regulation will become effective on and after the 1st of January, 1915.

85. All other coast stations shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulation No. 4.

86. Land Stations.—Land stations (commercial, experimental, etc.) shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulations Nos. 5, 6, 7, 18 or 32, according to the classification of the station.

EXAMINATION FOR RADIOTELEGRAPH CERTIFICATES OF PROFICIENCY.

87.—Applications.—Applications for permission to attend examinations for any certificate of proficiency must be made to the Deputy Minister of the Naval Service on the special form provided for that purpose (W. 13). The date and place of examination will be notified to the candidate as soon as possible after receipt of the application.

PERSONS ELIGIBLE TO ATTEND EXAMINATION.

88. (a) No person shall be permitted to attend examination for any class of certificate of proficiency in radiotelegraphy.

(i) who is not a natural born British subject;

(ii) who has at any time been of enemy nationality;

(iii) whose parents or either of them have at any time been of enemy nationality.

Provided, however, that any naturalised British subject who has not or whose parents or either of them have not at any time been of enemy nationality may be admitted to examination if his application be approved by the Minister of the Naval Service.

(b) Candidates for examination for first-class certificates of proficiency must be not less than eighteen years of age.

(c) For the purposes of this regulation a person shall be deemed to be of enemy nationality if he has at any time been a subject of a State with which Great Britain has been at war within the period of ten years immediately preceding the date of this regulation. (October 15th, 1919.)

SHIP STATIONS.

89. First-class Certificate.—Candidates for first-class certificates will be examined in the following subjects:—

(1) Transmission and reception at a speed of twenty words a minute;

(2) Adjustment, care and operation of apparatus;

(3) The regulations applicable to the exchange of radiotelegraph traffic.

The examination will consist of two sections "Practical" and "Written":—

"Practical" Section.

(a) To send on an ordinary radiotelegraph

key for five consecutive minutes at not less than the prescribed speed (viz., twenty words a minute, five letters being counted as one word); the accuracy of signalling, the correct formation of the letters, and the correctness of spacing will be taken into account.

(b) To receive and write legibly for not less than five consecutive minutes at the prescribed speed from signals received on a double headgear telephone receiver as ordinarily used for radiotelegraph reception.

(c) To connect up the apparatus with the help of a diagram of connections.

(d) To name the principal parts of the apparatus.

(e) To mention the most common faults which develop in the apparatus of the set in which he is being examined and the means usually taken to remedy them.

(f) To trace, locate, and remedy several such faults.

(g) To adjust the apparatus after it has been placed out of adjustment.

(h) To change the wavelength of the transmitter from 300 to 600 metres and *vice versa*.

(i) To reduce or increase the transmitting power.

"Written" Section.

(j) To complete a diagram of connections of the set in which the candidate is being examined.

(k) To answer seven technical questions on the equipment, including storage battery and emergency set, if any.

(l) To answer nine questions on the methods of handling radiotelegraph messages and the regulations applicable to the exchange of radiotelegraph traffic and communications as set out in the latest edition of the British Postmaster-General's Handbook and the service regulations annexed to the International Radiotelegraph Convention in force; the questions will also include the counting, checking and computation of tolls on three test messages. The candidate will also be required to have a thorough knowledge of the use of the "C.P.R.," "Western Union," and "G.N.W." tariff books and the "Official List of Radiotelegraph Stations" issued by the International Telegraph Bureau. Given these books, he will be required to compute the charges on a test message from any ship *via* any Canadian coast station to any telegraph office in the world.

90. Second-class Certificate.—Candidates for second-class certificates must pass a satisfactory examination on all the subjects prescribed for the first class, with the exception that the minimum speed of transmission and reception is reduced to twelve words a minute. Holders of this certificate will only be allowed to operate stations on ships in Classes 2a and 3, as specified in Regulations Nos. 81 and 83.

91. Third-class Certificate.—Third-class (Watcher's) certificate will authorise the holder to work at one station only, the name and call signal of which will be designated in the certificate.

* The "Postmaster-General's Handbook for Wireless Telegraph Operators" and the "International Radiotelegraph Convention of London" referred to in this section may be obtained from the department of the Naval Service, Ottawa, for the sum of 20 cents and 10 cents each, respectively, post free.

The examination will be practical and *viva voce* and the candidate will be required:—

(1) To distinguish from other signals the call signal of the station designated in the certificate, when it is repeated several times, at the rate of ten words a minute;

(2) To distinguish from other signals the distress call "SOS" when it is repeated several times, at the rate of ten words a minute;

(3) To adjust the receiver for incoming signals on the wavelength normally used;

(4) To test the detector with a buzzer or other testing appliances and to adjust it for the efficient reception of signals on the normal wavelength.

COAST AND LAND STATIONS.

92. Extra First-class Certificate.—Candidates for Extra First-class Certificates, in addition to taking a thorough examination on the subjects set out in sections (c) to (l) of Regulation No. 89, will be required:—

"Practical" Section.

(a) To send and receive in the International Morse Code for five minutes at a speed of not less than twenty-five words a minute, under the conditions prescribed in sections (a) and (b) of Regulation No. 89;

(b) To trace, locate and remedy faults in standard radiotelegraph installations, of not less than five kilowatt power, including valve detector, gasoline engines, D.C. and induction motors and to adjust the same for efficient operation.

(c) The practical use of a wavemeter.

"Written" Section.

(d) To answer seven questions on the principles governing the working of radiotelegraph installations, internal combustion engines and dynamo electric machinery, as used in connection with radiotelegraph installations;

(e) To answer seven questions on the International Radiotelegraph Convention and regulations annexed thereto, the Regulations issued by the Minister of the Naval Service and the procedure governing the obtaining of bearings from Direction Finding stations, the general organisation of a radiotelegraph service, including the procedure followed in connection with the transfer of business to and from land lines and the handling of radiotelegraph abstracts and accounts.

The holder of an extra first-class certificate will be authorised to operate on any Canadian coast, land or ship station.

93. First-class Certificate.—The examination for the first-class coast certificate will be similar in all respects to that for the first-class ship station certificate, with the exception that the candidate will be required to have a knowledge of the care and operation of gasoline engines.

94. Second-class Certificate.—The examination for the second-class coast certificate will be similar to that for the first class, with the exception that the minimum speed of transmission and reception is reduced to twelve words a minute.

95. Third-class Certificate.—The examination for the third-class coast certificate will be similar to that for the third-class ship certificate.

96. Experimental Certificate.—Candidates for an experimental certificate will be required:—

"Practical" Section.

(a) To send on an ordinary radiotelegraph key for five consecutive minutes at a speed of not less than twelve words a minute, five letters being counted as one word; the accuracy of signalling, the correct formation of the letters, and the correctness of spacing will be taken into account;

(b) To receive and write legibly for not less than five consecutive minutes at a speed of not less than twelve words a minute, five letters being counted as one word, from signals received on a double headgear telephone receiver as ordinarily used for radiotelegraphic reception, and to distinguish the signals "SOS," "STP," and his own call signal from among other signals, when sent at a speed of twenty words a minute;

(c) To reduce the transmitting power;

(d) To change the wavelength of the transmitter within the limits prescribed in the licence issued for the station;

(e) To adjust the apparatus after it has been placed out of adjustment.

"Written" Section.

(f) To complete a diagram of connections of the set in which the candidate is being examined;

(g) To answer seven technical questions on the equipment, including storage battery and emergency set, if any;

(h) To answer nine questions on the procedure governing the handling of radiotelegraph messages and the regulations applicable to the exchange of radiotelegraph traffic and communications, particularly as set out in part 5, sections 60 to 91 of the Postmaster-General's Handbook for Wireless Telegraph Operators, section 6, articles 20 to 35 of the regulations annexed to the International Radiotelegraph Convention, and the Minister's Regulations applicable to the operation of experimental stations.

***97. Amateur Experimental Certificate.**—Candidates for an amateur certificate will be examined in the adjustment and operation of the apparatus they propose to operate and will be required to have a satisfactory knowledge of the departmental regulations governing the working of amateur experimental stations (Regulations No. 19 to No. 31), and those annexed to the International Radiotelegraph Convention of London, applicable to and working of stations generally, particularly section 6, articles 20 to 35, entitled "Transmission of Radiotelegrams."

The examination will be practical and *viva voce*, and the candidates will be required to send and receive in the International Morse Code at a speed of not less than five words a minute and to distinguish from other signals the signals "SOS," "STP," and the call signal of his station when repeated several times at a speed of ten words a minute.

EXAMINATIONS GENERALLY.

98. Places at which examinations will be held.—Examinations will generally be con-

* The "Postmaster-General's Handbook for Wireless Telegraph Operators" and the "International Radiotelegraph Convention of London" referred to in this section may be obtained from the Department of the Naval Service, Ottawa, for the sum of 20 cents and 10 cents each, respectively, post free.

ducted at the Department of the Naval Service, Ottawa; special arrangements will, however, be made where circumstances permit for holding an examination at any radiotelegraph station or any technical school of telegraphy at which suitable apparatus is provided for the purpose.

99. The certificates of proficiency will indicate the system or systems of radiotelegraphy under which the candidate's examination was conducted.

100. **Failure to Pass.**—In case of failure a candidate will not ordinarily be re-examined until after the lapse of three months. An additional fee will be payable in respect of the further examination.

101. **Suspension of Certificate.**—Should it be proved to the satisfaction of the Minister that the holder of a "Certificate of Proficiency" has wilfully or negligently failed to comply with the provisions of the International Radiotelegraph Convention and Regulations, or of these regulations, or of any other regulations which may be issued from time to time for his guidance, the certificate may, at the discretion of the Minister, be suspended or cancelled.

INSPECTION OF STATIONS.

102. **Inspection.**—Any duly authorised officer of the department may, from time to time, and at all reasonable times, enter upon any coast, land or ship station, within the jurisdiction of Canada, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such station, also the working and user of such apparatus and telegraphic instruments, and all books and papers used in connection with the operation of such station. His authority will be in the form of a letter signed by the Deputy Minister of the Department of the Naval Service.

OPERATION OF SHIP STATIONS WITHIN THE TERRITORIAL WATERS OR HARBOURS OF CANADA.

103. **Ship Stations in Territorial Waters.**—*The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) shall not be worked while such ships are within the Territorial Waters of Canada, unless specific permission is granted therefor by the controlling Canadian coast stations for the locality, and then only provided such working does not interfere with the operation of any coast station established in Canada, and that the provisions of the Radiotelegraph Convention of London, 1912, and the Service Regulations annexed thereto are strictly observed.*

104. **Ship Stations in Harbours.**—(a) The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) shall not be worked whilst such ships are within a harbour of the Dominion of Canada, except as follows:—

(i) When direct communication between a ship in harbour and the shore is forbidden for quarantine or other special reasons, her radiotelegraph apparatus may be worked for one half hour after arrival and for one half hour before departure from such harbour.

(ii) For the purpose of making or answering signals of distress.

(b) For the proper enforcement of the above, ships in Canadian harbours shall, if so instructed by a Canadian Government

Radiotelegraph Inspector, or other properly authorised officer, completely disconnect the aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, in such a manner as to show they are properly disconnected.

105. *Penalty*.—Any person who violates any of the provisions of these regulations shall be liable on summary conviction to a penalty not exceeding fifty dollars and costs or three months' imprisonment.

EXTRACT FROM AIR REGULATIONS, 1919.

110. "No person shall instal or work a radiotelegraph or telephone apparatus in any aircraft primarily registered in Canada, except in accordance with the terms of a licence granted by the Minister of the Naval Service, and no person shall work any radiotelegraph or telephone apparatus on any aircraft, except in accordance with the provisions of the International Radiotelegraph Convention and the Service Regulations annexed thereto."

W. 42.

LIMITED COAST STATION LICENCE. Licence No.

Date 19

DOMINION OF CANADA.
LICENCE TO USE RADIOTELEGRAPHY.

Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

The herein named resident of hereinafter called the licensee, is hereby licensed to establish and operate a radiotelegraph coast station situated at for the term of one year commencing on the first day of April, 19 and terminating on the thirty-first day of March, 19 , and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of ten dollars (\$10), being the licence fee for the privilege above named.

This licence is subject to the Act and Regulations above referred to and to the following terms, conditions and restrictions:—

1. In this licence the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (i) The licensee shall not establish, instal, or work any apparatus for radiotelegraphy, except the apparatus hereinafter called "the licensed apparatus," specified in the said schedule hereto, nor use wavelengths other than those specified therein.

(ii) The use of the licensed apparatus shall except in cases of distress, be limited to the exchange of messages with such stations, vessels or lines of vessels as are specified in the schedule.

(iii) No tolls, fees, or other consideration shall be received, levied, or collected by the licensee until the same have been approved of by the Board of Railway Commissioners for Canada, and in no case shall they exceed those fixed by the International Radiotelegraph Convention of London, 1912.

3. (i) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in

Canada or the territorial waters abutting on the coasts of Canada (whether on shore or on any ship), by or for the purpose of the Minister or any Department of His Majesty's Government or for commercial purposes and in particular with the sending or receipt of any messages between or at radiotelegraph stations established as aforesaid on land and radiotelegraph stations established on ships at sea.

(ii) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees:—

(a) With respect to all arrangements to be adopted for the purposes of syntony or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station;

(b) With respect to any alteration of messages which the Minister may think necessary;

(c) Generally with respect to avoiding interference between one radiotelegraph station and another.

4. The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

5. (i) The coupling between the primary and secondary circuits of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

(ii) The logarithmic decrement per whole period, of the emitted waves, shall not exceed two-tenths, except when sending distress calls or messages relating to vessels in distress.

6. The licensee shall instal the apparatus at the station mentioned in the schedule, and the said station shall be placed in operation within months from the date of this licence, and shall be kept in operation continuously during the hours specified in the schedule, until this licence shall expire.

7. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraphic line.

8. The licensee shall, if so required in writing by the Minister, cease to use the licensed apparatus for such period (not exceeding hours in any one day), as may be specified by the Minister.

9. The Minister or his authorised officers may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

10. Subject to the provisions of this licence, the licensee shall transmit and receive messages by means of the licensed apparatus to and from any other station or to and from any ship without regard to the particular system of radiotelegraphy installed at such other station

Laws and Regulations—Canada

or on such other ship, on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise.

11. (i) If and whenever any Department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus, any message on His Majesty's Service (including messages to and from ships of His Majesty's Royal Navy or Canadian Government vessels), such messages shall have priority over all other messages (except messages of distress) and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

12. The licensee shall, so far as possible, receive from all ships and light stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in his power.

13. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus, nor shall he divulge to any person other than the addressee or his accredited agent the contents of any message coming to his knowledge intended for receipt by means of the licensed apparatus. The licensee shall exhibit at the said station a copy of form No. W. 40 issued by the Department of the Naval Service.

14. All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and ultimate destination, and such further particulars as the Minister shall, from time to time, reasonably require to be shown, messages on His Majesty's Service being distinguished in such registers from other messages. The licensee shall preserve all used message forms written and printed, and transcripts of messages and all other papers for such period as is from time to time prescribed by the Regulations of the International Radiotelegraph Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the office of the licensee, in between the hours of 10 a.m. and 5 p.m. on every day except Sunday or a public holiday.

15. The licensee shall make a monthly return to the Minister of all the messages handled by the licensed apparatus and in addition shall render to the Minister such accounts as the Minister shall direct in respect of all charges due or payable under the International Radiotelegraph Convention, in respect of ship-and-coast messages and shall pay to the Minister, at such times and in such manner as the Minister shall direct, all sums which shall be due from the licensee under such accounts.

16. All operators and other employees of the licensee at the said coast station shall be

British subjects, and must be of such age and hold such Certificates of Proficiency specified in the schedule annexed hereto.

17. The licensee shall observe at the station the provisions of the "Radiotelegraph Act" and those of the International Radiotelegraph Convention of London, 1912, and the detailed regulations from time to time made under each or either of them for carrying such provisions into effect.

18. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made against any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

19. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

20. In case of any breach, non-observance or non-performance by or on the part of the licensee, his servants or agents of any of the terms or conditions herein contained, and the part of the licensee to be observed and performed then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

21. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system of systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall, in his discretion, think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada by means of radiotelegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

22. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister, under these presents, may be under the hand of any authorised officer, at the time being, of the Department of the Naval Service and may be served by registered post letter to the office of the licensee and any notice to be given by the licensee, under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of coast station
2. Location
3. Latitude and longitude
4. Call signal.
5. Normal range :—
Day
Night
6. System of radiotelegraphy
7. Type of aerial
8. Characteristics of transmitter
9. Characteristics of receiver
10. Decrement per complete period.
11. Wavelength (normal underlined).
12. Source of power.

13. Maximum power taken by transmitter . . .
14. If A.C., number of cycles . . .
15. Hours of service . . .
16. Coast charge :—
Per word . . .
Minimum per message . . .
17. Operators to be borne on station :—
First class . . .
Second class . . .
Third class . . .
18. Total charge (ship and coast to apply on outward messages only) :—
Per word . . .
Minimum per message . . .
19. Stations with which the licensed station may communicate . . .

Deputy Minister of the Naval Service.

Department of the Naval Service, Ottawa.

Dated this day of 19

W. 18.

PUBLIC COMMERCIAL LICENCE.

F 19 Licence No.

DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPHY."

Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

The herein named resident of hereinafter called the licensee, is hereby licensed to establish and operate a Radiotelegraph land station situated at

for the term of one year commencing on the first day of April and terminating on the thirty-first day of March and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of Fifty Dollars (\$50), being the licence fee for the privilege above-named.

This licence is subject to the said Act and Regulations and to the following terms, conditions and restrictions :—

1. In this licence, the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context repugnant to such construction, that is to say :—

The expression "marine signalling" means signalling by means of any system of radiotelegraphy between two or more ships, between ships and any coast station, or between two Government coast stations; and the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. The licensee shall not establish, instal or work any apparatus for radiotelegraphy, except the apparatus hereinafter called "the licensed apparatus," specified in the said schedule hereto, nor shall wavelengths other than those mentioned therein be employed.

3. The working of the licensed station shall be limited to the exchange of messages with such coast and land stations as are specified in the schedule.

4. No tolls, fees, or other consideration shall be received, levied, or collected by the licensee until the same have been approved of by the Board of Railway Commissioners for Canada.

5. (i) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in Canada by any Department of His Majesty's Government, or with the marine signalling on the waters or territory of Canada or neighbouring waters or territory.

(ii) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees :—

(a) With respect to all arrangements to be adopted for the purpose of syntony or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station;

(b) With respect to any alternation of messages which the Minister may think necessary; and

(c) Generally with respect to avoiding interference between one radiotelegraph station and another.

6. The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

7. The licensee shall, if so required in writing by the Minister, cease to use the licensed apparatus for such period (not exceeding hours in any one day) as may be specified by the Minister.

8. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

9. (i) If the maximum power taken by the transmitter as mentioned in the schedule is less than 5 kw., then the coupling between the primary and secondary circuits of the transmitting oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits and the logarithmic decrement of the emitted waves per whole period, shall not exceed two-tenths.

(ii) In the case of stations using more than 5 kw. power the logarithmic decrement of the emitted waves per whole period shall be as specified by the Minister and as mentioned in the schedule.

10. (i) If and whenever any Department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus, any message on His Majesty's Service, such messages shall have priority over all other messages and the licensee, his servants and agents, shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

11. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus, nor shall he divulge to any person other than the addressee or his

accredited agent the contents of any message coming to his knowledge intended for receipt by means of the licensed apparatus. The licensee shall exhibit at the said station a copy of Form No. W.40, issued by the Department of the Naval Service.

12. (i) All messages transmitted by means of the licensed apparatus shall be copied in full in register to be kept by the licensee for that purpose and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and ultimate destination and such further particulars as the Minister shall, from time to time, reasonably require to be shown, messages on His Majesty's Service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for such period as is, from time to time, prescribed by the Regulations of the International Radiotelegraph Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the office of the licensee, in between the hours of 10 a.m. and 5 p.m. on every day, except Sunday, or a public holiday.

(ii) The licensee shall make a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose, and shall forward the same to the Minister at the end of each month.

13. The Minister or his authorised officers may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

14. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraphic line.

15. The licensee shall observe at the said station the provisions of the Radiotelegraph Act and the detailed regulations from time to time, made thereunder for carrying such provisions into effect; also such provisions of the International Radiotelegraph Convention of London, 1912, as are applicable to the operation of the station.

16. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

17. The licensee shall instal the apparatus at the station mentioned in the schedule and the said station shall be placed in operation within months from the date of this licence, and shall be kept in operation during the hours specified in the schedule until this licence shall expire.

18. All operators and other employees of the licensee at the said station shall be British subjects, and must be of such number and the holders of such certificate of proficiency as are specified in the schedule annexed hereto.

19. In case of any breach, non-observance or non-performance by or on the part of the licensee, his servants or agents, of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted and thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

20. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall, in his discretion, think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

21. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister, under these presents, may be under the hand of any authorised officer, for the time being, of the Department of the Naval Service and may be served by sending the same by registered post letter to the office of the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of station.....
2. Location.....
3. Call signal.....
4. Normal range:—
Day
- Night
5. System of radiotelegraphy.....
6. Type of aerial.....
7. Characteristic of transmitter.....
8. Characteristics of receiver.....
9. Decrement per complete oscillation.....
10. Wavelengths
11. Source of power
12. Maximum taken by transmitter.....
13. If A.C., number of cycles.....
14. Hours of service.....
15. Charges:—
Per word.....
- Minimum per message.....
16. Operators to be borne on station :.....
First class
- Second class
- Third class
17. Station with which the licensed station must communicate.....

Deputy Minister of the Naval Service.
Department of the Naval Service, Ottawa.
Dated this day of 19

W. 43.
PRIVATE COMMERCIAL LICENCE.

Licence No.
19 DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPHY."

Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

The herein named resident of _____ hereinafter called the licensee, is hereby licensed to establish and operate a radiotelegraph land station situated at _____ for the term of one year commencing on the first day of April _____ and terminating on the thirty-first day of March _____, and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of ten dollars (\$10), being the licence fee for the privilege above-named.

This licence is subject to the said Act and regulations, and to the following terms, conditions, and restrictions:—

1. In this licence, the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction that is to say:—

The expression "marine signalling" means signalling by means of any system of radiotelegraphy between two or more ships, between ships and any coast station, or between two Government coast stations; and the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. The licensee shall not establish, instal or work any apparatus for radiotelegraphy, except the apparatus hereinafter called "the licensed apparatus," specified in the said schedule hereto, nor shall wavelengths other than those mentioned therein be employed.

3. The working of the licensed station shall be limited to the exchange of messages with such coast and land stations as are specified in the schedule.

4. The station shall be worked solely for the transmission and reception of messages appertaining to the service or affairs of the licensee and no tolls, fees or other consideration shall be received, levied or collected by the licensee on account of any business or messages handled by the licensed apparatus.

5. (i) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in Canada by any Department of His Majesty's Government, or with marine signalling on the waters or territory of Canada or neighbouring waters or territory.

(ii) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees:—

(a) With respect to all arrangements to be adopted for the purpose of syntony or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station;

(b) With respect to any alteration of

messages which the Minister may think necessary; and

(c) Generally with respect to avoiding interference between one radiotelegraph station and another.

6. The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

7. The licensee shall, if so required in writing by the Minister, cease to use the licensed apparatus for such period (not exceeding _____ hours in any one day) as may be specified by the Minister.

8. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

9. (i) If the maximum power taken by the transmitter as mentioned in the schedule is less than 5 kw., then the coupling between the primary and secondary circuits of the transmitting oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits and the logarithmic decrement of the emitted waves per whole period shall not exceed two-tenths.

(ii) In the case of stations using more than 5 kw. power the logarithmic decrement of the emitted waves per whole period shall be as specified by the Minister and as mentioned in the schedule.

10. (i) If and whenever any department of the Government shall require the licensee, his servants, or agents to transmit, by means of the licensed apparatus, any message on His Majesty's Service, such messages shall have priority over all other messages and the licensee, his servants, and agents, shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

11. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus nor shall he divulge to any person other than the addressee or his accredited agent the contents of any message coming to his knowledge intended for receipt by means of the licensed apparatus. The licensee shall exhibit at the said station a copy of Form No. W. 40, issued by the Department of the Naval Service.

12. (i) All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and ultimate destination and such further particulars as the Minister shall, from time to time, reasonably require to be shown, messages on His Majesty's Service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and

printed, and transcripts of messages and all other papers for such period as is, from time to time, prescribed by the Regulations of the International Radiotelegraph Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the office of the licensee, in _____ between the hours of 10 a.m. and 5 p.m. on every day, except Sunday or a public holiday.

(ii) The licensee shall make a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose, and shall forward the same to the Minister at the end of each month.

13. The Minister or his authorised officers may from time to time, and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

14. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraphic line.

15. The licensee shall observe at the said station the provisions of the Radiotelegraph Act and the detailed regulations from time to time made thereunder for carrying such provisions into effect; also such provisions of the International Radiotelegraph Convention of London, 1912, as are applicable to the operation of the station.

16. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

17. The licensee shall instal the apparatus at the station mentioned in the schedule and the said station shall be placed in operation within _____ months from the date of this licence, and shall be kept in operation during the hours specified in the schedule until this licence shall expire.

18. All operators and other employees of the licensee at the said station shall be British subjects and must be of such number and the holders of such certificate of proficiency as are specified in the schedule annexed hereto.

19. In case of any breach, non-observance, or non-performance by or on the part of the licensee, his servants or agents, of any of the terms or conditions herein contained, and on the part of the licensee to be observed and performed, then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted and thereupon these presents and the said licences, powers, and authorities, and each and every of them shall absolutely cease, determine and become void.

20. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain, and work any system or systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion

think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter agreements for or to grant licences relating to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any persons whomsoever upon such terms as shall in his discretion think fit.

21. Any notice, request or consent (whether expressed in writing or not), to be given by the Minister, under these presents, may be given under the hand of any authorised officer, the time being, of the Department of Naval Service and may be served by sending the same by registered post letter to the _____ office of the licensee, and any notice to be given by the licensee under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of station.....
2. Location.....
3. Call signal.....
4. Normal range :—
Day.....
Night.....
5. System of radiotelegraphy.....
6. Type of aerial.....
7. Characteristics of transmitter.....
8. Characteristics of receiver.....
9. Decrement per complete oscillation.....
10. Wavelengths.....
11. Source of power.....
12. Maximum taken by transmitter.....
13. If A.C., number of cycles.....
14. Hours of Service.....
15. Charges :—
Per word.....
Minimum per message.....
16. Operators to be borne on station :—
First class.....
Second class.....
Third class.....
17. Stations with which the licensed station must communicate.....

Deputy Minister of the Naval Service,
Department of the Naval Service, Ottawa.
Dated this _____ day of _____ 19____

W. 20.

EXPERIMENTAL LICENCE.

Licence No. _____
DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPH."
Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

H The herein named _____ resident of _____ after called the licensee, is hereby licensed to establish and operate an experimental radiotelegraph station situated at _____ for the term of one year commencing on the first day of April, 19____, and terminating on the thirty-first day of March, 19____, and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of five dollars (\$5), being the licence fee for the privilege above named.

This licence is subject to the said Act and Regulations and to the following terms, conditions and restrictions:—

1. In this licence, the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (i) The licensee shall not establish, instal or operate any apparatus for radiotelegraphy, except the apparatus hereinafter called the "licensed apparatus," specified in the said schedule hereto, nor use wavelengths other than those specified therein.

(ii) The licensee shall work the licensed apparatus solely for the purpose of conducting experiments in radiotelegraphy and for no other purpose whatever.

3. (i) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in Canada or the territorial waters abutting on the coasts of Canada (whether on shore or on any ship), by or for the purposes of the Minister or any Department of His Majesty's Government or for commercial purposes and in particular with the sending or receipt of any messages between or at radiotelegraph stations established as aforesaid on land and radiotelegraph stations established on ships at sea.

(ii) With a view to preventing such interference as aforesaid the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees:—

(a) With respect to all arrangements to be adopted for the purpose of securing syntonised apparatus or for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station;

(b) Generally with respect to avoiding interference between one radiotelegraph station and another.

The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

5. (i) The coupling between the primary and secondary circuits of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

(ii) The logarithmic decrement per whole period of the emitted waves shall not exceed two-tenths except when sending distress calls or messages relating to vessels in distress.

6. The licensee shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus. The licensee shall exhibit at the said station a copy of Form No. W. 40, issued by the Department of the Naval Service.

7. The Minister or his officers may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of

such apparatus and telegraphic instruments respectively.

8. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraphic line.

9. The licensee shall at all times indemnify the Minister against all actions, claims, and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

10. The licensed apparatus shall only be worked by a person, or persons, holding certificates as are specified in the schedule annexed hereto.

11. The licensed apparatus shall be operated in accordance with the provisions of the Radiotelegraph Act and the regulations issued thereunder by the Governor in Council or the Minister, and also in accordance with such provisions of the International Radiotelegraph Convention as are applicable to such operation.

12. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

13. (i) The Minister may at any time in his absolute discretion give notice in writing to determine these presents, and the licence or permission hereby given at the end of one calendar month from the date of such notice, and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly, but without prejudice to any remedy of the Minister under any provision herein contained on the part of the licensee to be observed and performed.

(ii) The licensee shall, if so required by the Minister, cease to use the licensed apparatus for such period (not exceeding eight hours in any one day) as may be specified by the Minister.

14. In case of any breach, non-observance, or non-performance by or on the part of the licensee, his servants or agents of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted, and thereupon these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

15. Nothing in these presents contained shall prejudice or affect the right of the Minister from time to time, to establish, extend, maintain and work any system or systems, of radiotelegraphic communication (whether of a like nature to that hereby licensed or other wise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

16. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister under these presents may be under the hand of any authorised officer, for the time being, of the Department of the Naval Service, and may be served by sending the same by registered post letter to the licensee, and any notice to be given by the licensee under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of station.....
2. Location.....
3. Call signal.....
4. Type of aerial.....
5. Natural wavelength of aerial.....
6. Transmitting wavelengths.....
7. Decrement per complete oscillation.....
8. Source of power.....
9. If A.C., number of cycles.....
10. Maximum power to be taken by transmitter.....
11. Hours during which station must not transmit.....
12. Characteristics of transmitter.....
13. Characteristics of receiver.....
14. The station must be worked by persons holding the following certificates—
When transmitting on.....metre wave.....
When transmitting on.....metre wave.....
15. Stations with which the licensed station may communicate.....

Deputy Minister of the Naval Service.

Department of the Naval Service, Ottawa.

Dated this day of 19

W 44.

AMATEUR EXPERIMENTAL
LICENCE.

19 Licence No.

DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPHY."

Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

The herein named

I resident of herein-after called the licensee, is hereby licensed to establish and operate an experimental radiotelegraph station situated at for the term of one year commencing on the first day of April, 19 , and terminating on the thirty-first day of March, 19 , and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of one dollar (\$1) being the licence fee for the privilege above named.

This licence is subject to the said Act and Regulations and to the following terms, conditions and restrictions:—

1. In this licence, the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (i.) The licensee shall not establish, instal, or operate any apparatus for radiotelegraphy, except the apparatus hereinafter called the "licensed apparatus" specified in the said schedule hereto, nor use wavelengths other than those specified therein.

(ii.) The licensee shall work the licensed apparatus solely for the purpose of conducting experiments in radiotelegraphy and for no other purpose whatever.

3. (i.) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in Canada or the territorial waters abutting on the coasts of Canada (whether on shore or on any ship), by or for the purposes of the Minister or any Department of His Majesty's Government or for commercial purposes and in particular with the sending or receipt of any messages between or at radiotelegraph stations established as aforesaid on land and radiotelegraph stations established on ships at sea.

(ii.) With a view to preventing such interference as aforesaid the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees:—

(a) With respect to all arrangements to be adopted for the purpose of securing synchronised apparatus or for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station;

(b) Generally with respect to avoiding interference between one radiotelegraph station and another.

4. The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

5. (i.) The coupling between the primary and secondary circuits of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

(ii.) The logarithmic decrement per whole period, of the emitted waves, shall not exceed two-tenths.

6. The licensee shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus. The licensee shall exhibit at the said station a copy of Form No. W. 40, issued by the Department of the Naval Service.

7. The Minister or his officers may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations and the working and user of such apparatus and telegraphic instruments respectively.

8. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed, and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraphic line.

9. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents;

10. The licensed apparatus shall only be worked by a person, or persons, holding an Amateur Experimental Certificate of Proficiency in Radiotelegraphy as provided for in Regulation No. 97 of the Minister's Regulations.

11. The licensed apparatus shall be operated in accordance with the provisions of the Radiotelegraph Act and regulations issued thereunder by the Governor in Council or the Minister and in accordance with such provisions of the International Radiotelegraph Convention as are applicable to such operation.

12. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

13. (i.) The Minister may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby given at the end of one calendar month from the date of such notice, and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly, but without prejudice to any remedy of the Minister under any provision herein contained on the part of the licensee to be observed and performed.

(ii.) The licensee shall, if so required by the Minister, cease to use the licensee's apparatus for such period (not exceeding eight hours in any one day) as may be specified by the Minister.

14. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then, and in any such case, the Minister may, by writing, revoke and determine these presents, and the licences, powers and authorities hereinbefore granted, and thereupon these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

15. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

16. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister under these presents may be under the hand of any authorised officer, for the time being, of the Department of the Naval Service, and may be served by sending the same by registered post letter to the licensee, and any notice to be given by the licensee under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of station
2. Location
3. Call signal

4. Classification of station under Regulation No.
5. Type of aerial
6. Natural wavelength of aerial
7. Transmitting wavelength
8. Decrement per complete oscillation
9. Characteristics of transmitter
10. Characteristics of receiver
11. Source of power
12. Maximum to be taken by transmitter
13. If A. C., number of cycles
14. Hours during which the station must not transmit
15. Stations with which the licensed station may communicate

Deputy Minister of the Naval Service.

Department of the Naval Service, Ottawa.

Dated this day of

19

W. 19.

SHIP LICENCE.

19 Licence No.

DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPHY."

Issued in accordance with the provisions of the Radiotelegraph Act, Chapter 43, Statutes 1913, and the Regulations of the Minister made thereunder.

Class Ship Station.

J The herein named resident of hereinafter called the licensee, is hereby licensed to establish and operate a radiotelegraph station on board the vessel for the term of one year commencing on the first day of April, nineteen hundred and and terminating on the thirty-first day of March nineteen hundred and and to instal and operate at such stations the apparatus mentioned in the schedule hereto on payment of the sum of one dollar (\$1), being the licence fee for the privilege above-named.

This licence is subject to the said Act and Regulations and to the following terms, conditions and restrictions:—

1. In this licence the term "Minister" shall mean the Minister or the Deputy Minister of the Naval Service for the time being.

2. (i.) The licensee shall not establish, instal or operate any apparatus for radiotelegraphy, except the apparatus hereinafter called the "licensed apparatus," specified in the said schedule hereto, nor use wavelengths other than those specified therein.

(ii.) The ship station shall be of such class mentioned in Regulations Nos. 34, 35 or 36 of the Minister's Regulations, as is specified in the said schedule annexed hereto.

3. No tolls, fees or other consideration shall be received, levied or collected by the licensee until the same have been approved of by the Board of Railway Commissioners for Canada, and in no case shall they exceed the maximum fixed by the International Radiotelegraph Convention of London, 1912.

4. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Minister, from time to time, for the purpose of preventing interference with the working of any other radiotelegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other radiotelegraph station.

5. The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

6. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

7. (i) The coupling between the primary and secondary circuits of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

(ii) The logarithmic decrement per whole period, of the emitted waves, shall not exceed two-tenths except when sending distress calls or messages relating to vessels in distress.

8. The licensee shall, so far as possible, receive from all ships and light stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in his power.

9. Subject to the provisions of this licence, and in accordance with the regulations issued from time to time by the Minister, the licensee shall transmit and receive messages by means of the licensed apparatus to and from any coast station or to and from any other ship station without regard to the particular system of radiotelegraphy installed at such coast station or on such other ship, on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise, provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

10. (i) If and whenever any Department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus any message on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Canadian Government vessels), such messages shall have priority over all other messages (except messages of distress), and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall until transmission thereof, suspend transmission of all other messages.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

11. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any messages coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus, nor shall he divulge to any person other than the addressee or his accredited agent the contents of any message coming to his knowledge intended for receipt by means of the licensed apparatus, and the licensee shall exhibit at the said station a copy of Form No. W. 40, issued by the Department of the Naval Service.

12. All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that

purpose, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its places of origin and ultimate destination and such further particulars as the Minister shall from time to time reasonably require to be shown, messages on His Majesty's Service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and printed, and transcripts of messages and all other papers for such period as is from time to time prescribed by the Regulations of the International Radiotelegraph Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the office of the licensee, in

between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a public holiday.

13. The licensee shall prepare a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose, and shall forward the same to the Deputy Minister of the Naval Service at the end of each month.

14. The licensee shall render to the Minister such accounts as the Minister shall direct in respect of all charges due or payable under the Radiotelegraph Convention, 1912, in respect of messages exchanged between the ship station hereby licensed and coast stations or other ship stations, and shall pay to the Minister at such times and in such manner as the Minister shall direct all sums which shall be due from the licensee under such accounts.

15. The Minister or his duly authorised officers may, from time to time and at all reasonable times, enter upon the herein licensed ship station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

16. The licensee shall observe at the said station the provisions of the Radiotelegraph Act and International Radiotelegraph Convention of London, 1912, and the detailed regulations from time to time made under each or either of them for carrying such provisions into effect.

17. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

18. (i) The licensed apparatus at the said ship station shall be worked only by a person or persons holding a certificate or certificates issued by the Minister, the British Postmaster-General or the corresponding authorities of any self-governing British colony or the Government of India, and the licensee shall provide for the working of the station such operators as are required by the provisions of Regulations Nos. 80, 81, 82 or 83 of the Minister's Regulations according to the classification of the station as is specified in the schedule annexed hereto.

(ii) A certificate shall not be recognised as authorising the holder to work a ship station under the terms of this licence unless it bears a statement that it is issued in accordance with the Radiotelegraph Convention, 1912.

19. The licensee shall carry on the ship on which the ship station is established under this licence a properly certified copy of such licence, and shall produce such copy for inspection if required so to do by the duly

authorised officials of the countries where the ship calls, and the following documents:—

Postmaster-General's Handbook for Wireless Telegraph Operators:

Official list of Radiotelegraph Stations:

Official list of Call Signals :

C.P.R., G.N.W. or Western Union Tariff Book:

Adequate supply of telegraph forms;
International Radiotelegraph Convention of
London, 1912:

and also such other documents as may be prescribed by the Minister, for the purpose of enabling the licensee to communicate with coast and ship stations in accordance with the rules and regulations of the International Radiotelegraph Convention, 1912.

20. In case of any breach, non-observance or non-performance by or on the part of the licensee, his servants or agents of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted, and thereupon these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

21. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

22. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister under these presents may be under the hand of any authorised officer, for the time being, of the Department of the Naval Service and may be served by sending the same by registered letter to the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

GENERAL.

1. Name of ship
2. Port of registry
3. Owner
4. Classification
5. Apparatus operated by
6. Call signal
7. Nature of service
8. Watches to be maintained
9. Operators to be borne on station—
 First class
- Second class
- Third class
10. Ship charge—
 Per word
- Minimum per message

MAIN APPARATUS.

11. Normal range.....
-
12. System of radiotelegraphy

13. Type of aerial.....
 14. Transmitting wavelength (normal underlined).....
 15. Source of power.....
 16. Maximum taken by transmitter.....
 17. Decrement per complete oscillation.....
 18. Characteristics of transmitter.....
 19. Characteristics of receiver.....
- EMERGENCY APPARATUS.**
20. Normal range.....
 21. Wavelength.....
 22. Source of power and capacity of same.....
 23. Type of transmitter.....

EMERGENCY APPARATUS.

20. Normal range.
21. Wavelength.
22. Source of power and capacity of same
23. Type of transmitter.

Deputy Minister of the Naval Service.

Deputy Minister of the Naval Service.
Department of the Naval Service, Ottawa.

Dated this day of 19 19 19

W. 66.

Training School Licence.

Licence No.

Training School Experience.	Experience No.
19	Call Signal

DOMINION OF CANADA.

"LICENCE TO USE RADIOTELEGRAPHY."

Issued in accordance with the provisions of
the Radiotelegraph Act, Chapter 43,
Statutes 1913, and the Regulations made
thereunder.

The herein named
K resident of
 hereinafter called the licensee, is
 hereby licensed to establish and operate
 a radiotelegraph Training School situated
 at _____ for the term of
 one year commencing on the first day of April,
 19____, and terminating on the thirty-first day
 of March, 19____, and to instal and operate
 at such station the apparatus mentioned in
 the schedule hereto, on payment of the sum
 of One Dollar (\$1), being the licence fee for
 the privilege above-named.

This licence is subject to the said Act and Regulations and to the following terms, conditions and restrictions :—

1. In this licence the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (i.) The licensee shall not establish, instal or operate any apparatus for radiotelegraphy, except the apparatus hereinafter called the "licensed apparatus" specified in the said schedule hereto, nor use wavelengths other than those specified therein.

(ii.) The licensee shall work the licensed apparatus solely for the purpose of instruction in radiotelegraphy and for no other purpose whatever.

3. (i.) The licensee shall so work the licensed apparatus as not to interfere with the working of any radiotelegraph station established in Canada or the territorial waters abutting on the coasts of Canada (whether on shore or on any ship), by or for the purposes of the Minister or any Department of His Majesty's Government or for commercial purposes and in particular with the sending or receipt of any messages between or at radiotelegraph stations established as aforesaid on land and radiotelegraph stations established on ships at sea.

(ii.) With a view to preventing such interferences as aforesaid the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees :—

(a) With respect to all arrangements to be adopted for the purpose of securing synchronised apparatus or for enabling the messages exchanged by means of the licensed apparatus to be distinguished

from those emanating from any other radiotelegraph station;

(b) Generally with respect to avoiding interference between one radiotelegraph station and another.

4. (i) The coupling between the primary and secondary circuits of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

(ii.) The logarithmic decrement per whole period, of the emitted waves, shall not exceed two-tenths.

5. All apparatus used or intended to be used by the licensee shall be so erected, fixed, placed and used as not, either directly or by reason of the working or user thereof, to interfere with the efficient or convenient maintenance, working or user of any telegraph or telephone line.

6. The Minister or his officers, may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such stations and the working and user of such apparatus and telegraphic instruments respectively.

7. The licensed apparatus shall not, without the consent of the Minister be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

8. The licensed apparatus shall be operated in accordance with the provisions of the Radiotelegraph Act and the Regulations issued thereunder by the Governor in Council or the Minister and in accordance with such provisions of the International Radiotelegraph Convention as are applicable to such operation.

9. The licensee shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the and not intended for receipt by means of the licensed apparatus. No person shall operate or work the receiving apparatus at the licensed school who has not subscribed to, and filed with, the Minister of the Naval Department, a Declaration of Secrecy as prescribed in Section 6 of the Radiotelegraph Act and Radiotelegraph Regulation No. 72.

The licensee shall exhibit at the said station a copy of Form No. W. 40, issued by the Department of the Naval Service.

10. At least one of the instructors at the licensed school shall be the holder of a First-class Canadian Certificate of Proficiency in Radiotelegraphy. Other instructors, teaching in one or two subjects only, must have passed a successful examination in the subject or subjects, with which they propose to deal; the papers for this examination and the percentage of marks to be obtained will be as prescribed for the examination for a First-class Canadian Certificate of Proficiency in Radiotelegraphy.

11. The licensee shall at all times indemnify the Minister against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

12. Except with the consent in writing of the Minister, the licensee shall not assign or sublet this licence.

13. (i) The Minister may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby given at the end of one calendar month from the date of such notice, and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly, but without prejudice to any remedy of the Minister under any provision herein contained on the part of the licensee to be observed and performed.

(ii) The licensee shall, if so required by the Minister, cease to use the licensed apparatus for such period (not exceeding eight hours in any one day) as may be specified by the Minister.

14. In case of any breach, non-observance or non-performance by or on the part of the licensee, his servants or agents, of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case, the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted, and thereupon these presents and the said licences, powers and authorities and each and every one of them shall absolutely cease, determine and become void.

15. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of radiotelegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of radiotelegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Canada, by means of radiotelegraphy, with or to any person or persons whomsoever, upon such terms as he shall, in his discretion, think fit.

16. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Minister under these presents may be under the hand of any authorised officer, for the time being, of the Department of the Naval Service, and may be served by sending the same by registered post letter to the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered post letter addressed to the Deputy Minister of the Naval Service, Ottawa.

SCHEDULE.

1. Name of station
2. Location
3. Call signal
4. Type of aerial
5. Natural wavelength of aerial
6. Transmitting wavelength
7. Decrement per complete oscillation
8. Characteristics of transmitter
9. Characteristics of receiver
10. Source of power
11. Maximum to be taken by transmitter ..
12. If A. C., number of cycles
13. Hours during which the station must not transmit
14. Stations with which the licensed station may communicate

Deputy Minister of the Naval Service.

Department of the Naval Service, Ottawa.
Dated this day of 19

CIRCULAR LETTER TO MASTERS OF
MERCHANT SHIPS FITTED WITH
RADIOTELEGRAPH APPARATUS

L The attention of masters of merchant ships fitted with radiotelegraph apparatus is called to the following notice of change in wavelength at Canadian D.F. stations:—

"On and after August 1st, 1920, the Canadian Radiotelegraph Direction Finding Stations at Cheburto Head, N.S., Canso, N.S. and Cape Race, Newfoundland, will use the

wavelength of 800 metres exclusively for transmission and reception.

"It will be necessary for all ships to have their transmitters adjusted to transmit on 800 metres if they desire to obtain bearings from the above stations.

"All use of the wavelength of 600 metres by Canadian D.F. stations will be discontinued after August 1st, 1920."

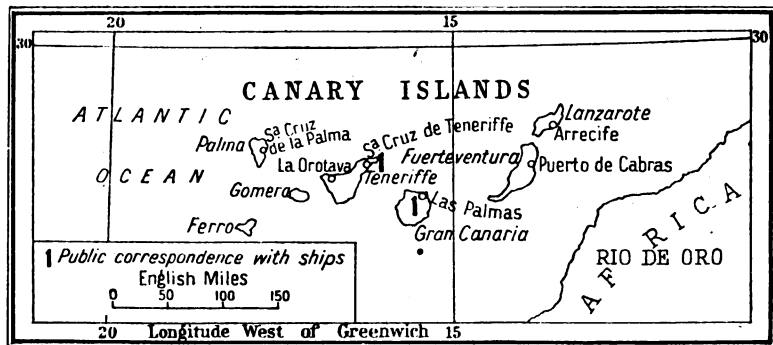
A revised reprint of Canadian Notice to Mariners No. 4 of 1919, embodying the above change, will be issued shortly.

June 10th, 1920.

CANARY ISLANDS

THE group of islands known under the above name consists of seven large and several small islands, whose combined area amounts to about 2,800 square miles and possesses a population of 360,000. It is commonly supposed that these islands constituted the Fortunate Islands of ancient history. They were forgotten, however, for several hundreds of years, but were re-discovered in 1334, when a French vessel was driven on to them by a storm.

They constitute at the present time a colony of Spain, and are administered by Spanish representatives.



CONTROL.

Wireless telegraphy in the islands is under the control of the Compañia Nacional de Telegrafia sin Hilos, which possesses two stations, one at Tenerife and the other at Las Palmas.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Enrique Gallego ..	Chief Engineer	Teneriffe and Las Palmas.
Mr. B. Walsh ..	Assistant Engineer	Teneriffe.
Mr. W. Sparkes ..	Assistant Engineer	Las Palmas.

There are five operators at each station.

ORGANISATION.

At the end of 1911 the Compañia Nacional de Telegrafia sin Hilos took over the wireless stations of Tenerife and Las Palmas (at that time of 20 kw. power) from the old French company, and held trial programmes with the Poldhu station in England. As a result of this, each station was fitted with a Marconi 3 kw. set for ships. At the present time Tenerife has two valve receivers and one crystal receiver for ships, with a low frequency amplifier. It is anticipated that the Spanish Government will shortly instal a direction-finding station, but at present the site has not yet been fixed. The Tenerife station sends out Press Bulletins in English and Spanish daily at 0330. Under the jurisdiction of the Canary Islands falls the military radio station at Cabo Juby, on the African mainland. This is a 3 kw. Telefunken set.

ADMINISTRATION.

No special Laws and Regulations exist under which wireless telegraphy and telephony are administered, their working being regulated in accordance with the International Rules.

CAPE VERDE ISLANDS

(See PORTUGAL.)

CEYLON

(See map on p. 274.)

THIS British Colony, lying S.E. of Hindustan (latitude $5^{\circ} 53' 5''$ to $9^{\circ} 50' N.$; longitude $79^{\circ} 48'$ to $81^{\circ} 52' E.$), possesses a written history dating from 543 B.C., and the Portuguese were the first of European nations to fix a permanent settlement in the Island; this occurred in A.D. 1511. The Portuguese gave place to the Dutch in 1658, and the latter surrendered Ceylon to the British in 1796, possession being confirmed by treaty in 1802. The Island is administered by a Governor aided by an Executive Council of seven and a Legislative Council of twenty-one members.

CONTROL.

The Wireless Station is under the control of the Postmaster-General and the Director of Telegraphs. The actual working is vested in the undermentioned officials:—

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. A. E. McCloskey ..	Chief Telegraph Engineer	Colombo.
Mr. G. W. J. Praat ..	Superintendent of Traffic	Colombo.
Mr. M. J. Golightly ..	Officer in Charge of the Wireless Station ..	Colombo.

The rest of the operating staff are members of the Postal Department. The station belongs to the Government. There are no Experimental Amateur or Ships' Stations licensed in Ceylon, and no Wireless Clubs or Societies exist in the Island.

ORGANISATION.

The erection of the first Wireless Station for Ceylon was sanctioned by the Ceylon Government in 1910. Finally a site in Colombo was adopted as the best available from an "all-round" standpoint for a single station. The contract for the station was given to the Marconi Wireless Telegraph Co. in 1911 and the station was brought into use in 1912. A station has been erected at Matura and is under the control of the Admiralty. Arrangements for the transmission of Time and Weather Signals have not yet been completed, but it is hoped to include particulars in a subsequent edition.

ADMINISTRATION.

Wireless Telegraphy in Ceylon and its territorial waters was originally legislated for under an Ordinance of 1903. In 1908 an Ordinance (No. 35) regulating Telegraphy in general was passed, which was afterwards extended to affect Wireless Telegraphy by an Amending Ordinance (No. 15), passed in 1914. This later Ordinance, however, specifically cancelled a provision, contained in that of 1908, which provided for the continuance in force of the original 1903 enactment. The latter has, therefore, now been completely abrogated, and Wireless Telegraphy in Ceylon is regulated (a) by such clauses of the 1908 Ordinance as are applicable to Wireless Telegraphy; (b) by the Amending Ordinance (No. 15) of 1914; and (c) by the rules formulated under the provision of the latter Ordinance.

We print below the apposite sections of Ordinance 15 of 1914 and the rules based upon it.

A—Ordinance No. 15 of 1914 (August 18th);

B—Rules under this Ordinance.

ORDINANCE.

A Ordinance No. 15 of 1914 (modifying Ordinance No. 35 of 1908) and dated August 3rd, 1914, provides in its Clause 5 an amendment of Section 7 of the 1908 Ordinance. This prescribes the right of the Governor in Executive Council to "make rules, consistent with the Ordinance, for the conduct of all or any telegraphs established, maintained, or worked by the Government or by persons licensed under this Ordinance." Rules under this section may provide for all or any of the following, amongst other matters, that is to say:—

(a) The rates at which, and the other conditions and restrictions subject to which messages shall be transmitted.

(b) The precautions to be taken for preventing the improper interception or disclosure of messages.

(c) The period for which, and the conditions subject to which, telegrams and other documents belonging to, or being in the custody of, telegraph officers shall be preserved; and

(d) The fees to be charged for searching for telegrams and other documents in the custody of any telegraph officer.

(e) For prescribing the form and the manner in which applications for licences under this Ordinance are to be made.

(f) For prescribing fees payable on the grant of any licence.

(g) For regulating the manner in which an apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of Ceylon, shall be worked so as to prevent interference with naval signalling, or the working of any wireless telegraph or telephone station lawfully established, installed, or worked in Ceylon or the waters thereof, and so as not to interrupt or interfere with the transmission of any messages between wireless telegraph or telephone stations established as aforesaid on land and wireless telegraph or telephone stations established on ships at sea.

(h) For prohibiting, except with the special or general permission of the Postmaster-General of Ceylon, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, while such ship is in any of the harbours of Ceylon.

(i) For prohibiting or regulating, in case at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of Ceylon, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may deem fit to make from time to time, either in all cases, or in such cases as may be deemed desirable.

Moreover, Clause 6 of Ordinance No. 15 of 1914 adds to Clause 7 of the 1908 Ordinance a new sub-section lettered (2) A, which runs as follows:—

Provided that no regulations made in respect of the matters described in paragraphs (g), (h), and (i) or sub-section (2) of this section shall apply to the use of wireless telegraphy

for the purpose of making or answering signals of distress.

* * *
RULES.

B The current rules, under which the wireless telegraphy is at present administered, were issued on December 3rd, 1914. They were based on Ordinance 15 of 1914 (see above) and run as follows:—

DECEMBER 3RD, 1914.

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony, or on board any British ship registered in the Colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—

(a) Of the place or ship in respect of which a licence is sought;

(b) Of the nature of the apparatus which it is desired and proposed to instal and work; and

(c) Of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences:

	Rs.
(a) For a licence for a land station	5
(b) For a licence for a ship station	5
(c) For an experimental licence	Free

3. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony, shall be worked in such a way as not to interfere with:

(a) Naval signalling; or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the Colony or in waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. In these regulations "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station, whether on shore or on any ship.

5. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour, port, or bay of the Colony, except with the special or general permission of the Postmaster-General.

6. (i) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, and notice to that effect is published by the Postmaster-General, after the publication of such notice and until further notice the use of wireless telegraphy on board merchant ships, whether British or foreign, whilst in the waters of the Colony, shall be subject to such rules as may be made by the Governor, and such rules may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

(ii) Such notice as aforesaid shall be published in the *Ceylon Government Gazette*,

and in such other manner, if any, as to the Postmaster-General may seem fit.

7. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

8. Any summons or other document in any proceedings under these regulations shall be

deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

9. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

CHILE

THE narrow strip of territory constituting the Republic of Chile lies between that remarkable range of mountains known as the Andes, and the Pacific Ocean. The country is divided into 23 provinces, and the total estimated population in 1915 was about $3\frac{1}{2}$ millions.

CONTROL.

Wireless Telegraphy in Chile is a State monopoly under the management of the Naval Department.

All Chilean wireless stations, both ship and land, are controlled by the Admiralty, and the Wireless Section of the Navy forms part of the general organisation administering naval affairs.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Rear-Admiral Don Miguel Aguirro	Chief of the General Maritime Office	Direction del Territorio Marítimo
Lieut. - Com. Don Hector Alliende	Head of the Wireless Section ..	Santiago de Chile Do. Do. Do.

ORGANISATION.

The first practical demonstration of wireless telegraphic communication was given in 1904, when the Marconi Company conducted a series of successful experiments between the Chilean Navy Cruisers "Esmeralda" and "Errazuriz," the apparatus utilised being coil and coherer sets.

At the present time the number of stations in operation total 56; these include 16 land stations varying in power from $\frac{1}{2}$ kw. to 100 kw. The stations fall under the following classification:—

Ship Stations	— Naval	.. .. 25
" "	— Mercantile	.. .. 15
Land Stations	— Open to public service	.. .. 11
" "	— Control	.. .. 1
" "	— Experimental	.. .. 2
" "	— For aviation services	.. .. 1
" "	— Amateur	.. .. 1

ADMINISTRATION.

Below will be found the Law and Regulations governing the use of wireless in Chile.

A—Law governing wireless service in Chile.

B—Regulations made thereunder.

PROJECT OF LAW GOVERNING THE WIRELESS SERVICE IN THE CHILIAN REPUBLIC.

MONOPOLY OF THE STATE.

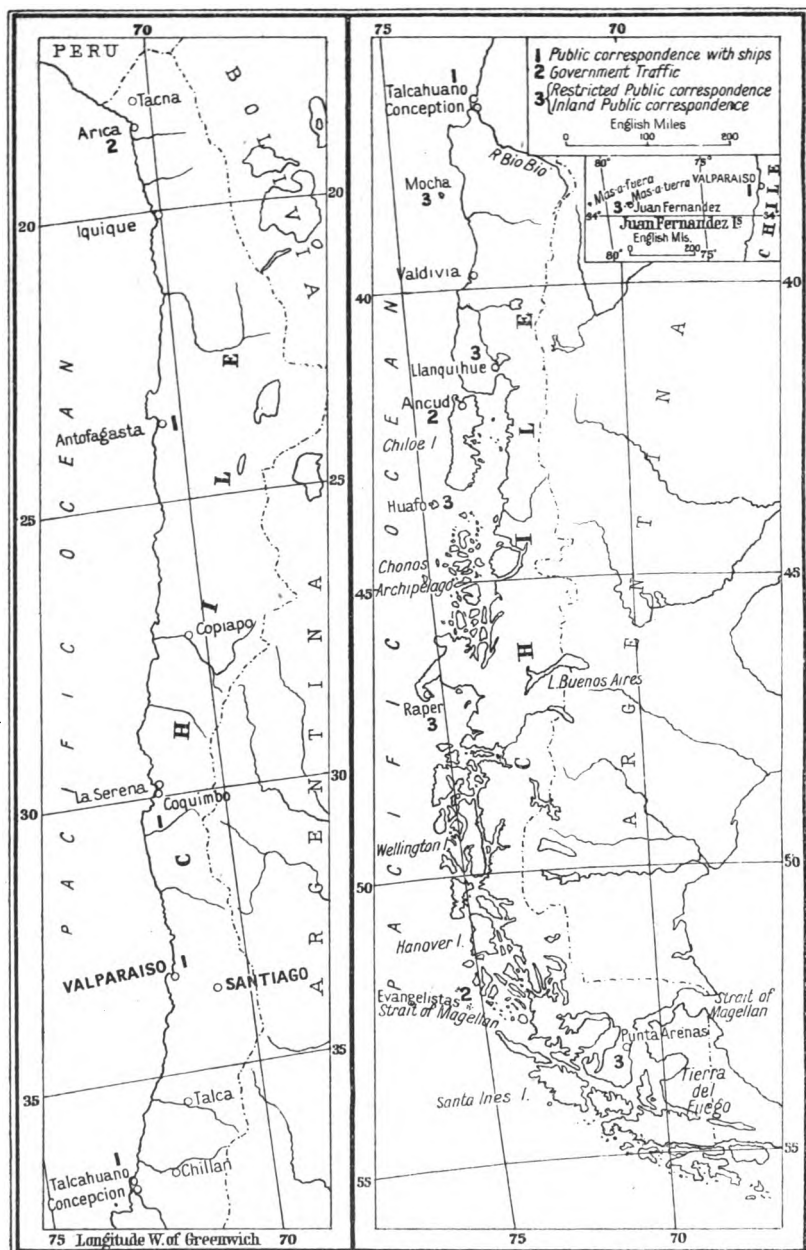
A ART. 1.—Wireless stations destined to transmit and receive wireless signals to or from other wireless stations in Chile or in any other foreign country, can only be installed and worked by the State.

Nevertheless, the State may permit the

installation and working of private wireless stations destined exclusively to experimental work or for purposes of instruction, but under the condition that the power of such stations shall not exceed $1\frac{1}{2}$ h.p. All wireless stations installed for experimental or educational purposes shall be submitted to the inspection and control established in the respective regulation.

ART. 2.—All persons that instal or attempt to instal clandestine wireless stations of any kind shall be liable to punishment according to

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the regulations of the service and the laws of the country.

The State will confiscate all the material employed in these clandestine stations.

ERECTION OF WIRELESS STATIONS.

ART. 3.—(a) The State will dispose of the installation of all the wireless stations in the country electing the sites according to plans consulting all military, naval and commercial necessities of the country.

(b) In those isolated regions of the country where private persons solicit wireless communication and there exists manifest convenience in the establishment of such communications, wireless stations may be installed, but under the condition that the land required shall be ceded to the State by those interested also the total cost or that part of the cost decided upon by the Government, shall be borne by the persons or parties interested in the said communication.

At the termination of the construction of such stations the same shall pass over wholly to the State together with the land occupied.

UNIFORMITY OF SYSTEM.

ART. 4.—The wireless installations shall be as uniform as possible, and of a national type that shall satisfy the wireless service of the country and the different parts shall, as far as possible, be made in the country.

CONTROL.

ART. 5.—All the wireless stations destined to transmit or receive wireless communications of any kind shall be under the charge of the Ministry of Marine, and the stations shall be worked by personnel of the Navy with exception of the Army wireless stations which will be under the charge of the Ministry of War.

PUBLIC SERVICE.

ART. 6.—The Minister of Marine will designate the wireless stations that may attend public service of wireless communication.

These stations shall be directly connected to the State land telegraphs, which will serve to connect the wireless stations with the general public.

The tariffs shall be collected under the charge of the Minister for Home Affairs, and the said Ministry shall maintain all relations and communications that the wireless service may cause with other foreign administrations, wireless telegraph companies, telegraph or cable companies.

SHIP STATIONS.

ART. 7.—(a) Six months after this law is passed no ship will be allowed to enter or leave any of the ports of the Chilean Republic that carries 50 or more persons on board (including the crew), unless the ship is installed with wireless telegraph apparatus.

The wireless apparatus must be in working order and be capable of transmitting and receiving

messages at a distance not less than 200 miles during the daytime.

(b) In certain accidental cases expressly determined by the respective regulations, ships may be allowed to enter or leave Chilean ports, although they may be carrying 50 or more persons on board, and are not installed with wireless telegraph apparatus.

(c) The respective regulation will fix the number of operators, capable of working the wireless installation that all merchant ships must carry according to their class, which class will be determined by the same regulation.

(d) Any infraction or attempt at infraction of this article will be fined the sum of from one to five thousand Chilean gold dollars.

CONDITIONS THAT WIRELESS INSTALLATIONS ON CHILIAN MERCHANT SHIPS MUST FULFIL.

ART. 8.—(a) The wireless apparatus installed on board Chilean merchant ships will be subjected to the conditions that the respective regulations may fix.

(b) All wireless operators on board Chilean merchant ships must be of Chilean nationality.

(c) The Government will establish annexed to the Naval wireless school, the necessary courses of instruction to form operators destined to serve in the National Merchant Marine.

The cost of these courses will be paid for by the companies or persons concerned, in the form to be indicated by the respective regulation.

FUNDS FOR THE SERVICE.

ART. 9.—In the annual budget funds will be consulted to maintain and increase the State Wireless Telegraph Service.

REGULATIONS.

ART. 10.—The President of the Republic will dictate the necessary regulations for the fulfilment of this law. (N.B.—These are not as yet formulated, but are in course of being drawn up.)

ART. 11.—This law will come into force from the date of its publication in the Official Gazette.

REGULATIONS MADE BY CHILIAN ADMINISTRATION.

PARAGRAPH IX.

(Supreme Decree of 7th October, 1878, concerning Merchant Shipping.)

ART. 1.—Every sailing or mechanically propelled ship having 50 and more persons on board including the crew, should carry a wireless installation with a communicating power of 200 miles radius during the day.

ART. 2.—When about to effect the wireless installation the companies or shipowners should apply to the maritime authorities for the permission or right which the Government grants for radiotelegraphic stations.

[The above regulations came into force on October 1st, 1920.]

CHATHAM ISLANDS

(See NEW ZEALAND.)

CHINA

(1) FOREIGN SETTLEMENTS.

(For Laws of the Republic see under "Chinese Republic," page 204.)

(A) Hong-Kong.

THE Crown Colony of Hong-Kong consists of a number of islands situated off the south-eastern coast of China, at the mouth of the Canton River, and of a portion of the adjacent mainland. They lie between latitude $22^{\circ} 10'$ and $22^{\circ} 34' N.$; whilst the longitude extends between $113^{\circ} 52'$ and $114^{\circ} 30' E.$ The capital of the Colony is Victoria, built on the northern shore of Hong-Kong Island, facing the mainland. The magnificent harbour consists of the arm of the sea which lies between the mainland and the city. It was first occupied by Great Britain in January, 1841, and is now administered as a Crown Colony under a Governor aided by an Executive Council of eight members and a Legislative Council of thirteen.

CONTROL AND ORGANISATION.

Hong-Kong possesses two wireless stations, one of which, at Cape D'Aguilar, is for commercial service. This station is under the control of the Postmaster-General and is manned by a naval crew. Meteorological observations are exchanged with ships and time signals distributed free of charge. Arrangements have not yet been made for the installation of an aviation station.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. M. J. Breen	Postmaster-General	Hong-Kong
Mr. H. Blandon	Commander Telegraphist, Royal Navy ..	Hong-Kong

ADMINISTRATION.

The regulation of wireless telegraphy is carried on under the provisions of the Wireless Telegraphy Ordinance, 1913, passed on July 24th of that year, which repealed all previous Ordinances; and by regulations issued under that Ordinance.

A—The Wireless Telegraphy Ordinance, 1913.

B—Regulations.

C—Ship Licence.

D—Permit to use wireless telegraphy on ships in the harbours of the Colony.

ORDINANCE No. 20 OF 1913.

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. "Telegraph" means an electric, galvanic or magnetic telegraph and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communications by means of electricity, galvanism or magnetism.

The expression "Wireless Telegraphy" means any system of communication by "telegraph" as (defined in this Ordinance) without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: provided that nothing in this Ordinance shall prevent any person from making or using an electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

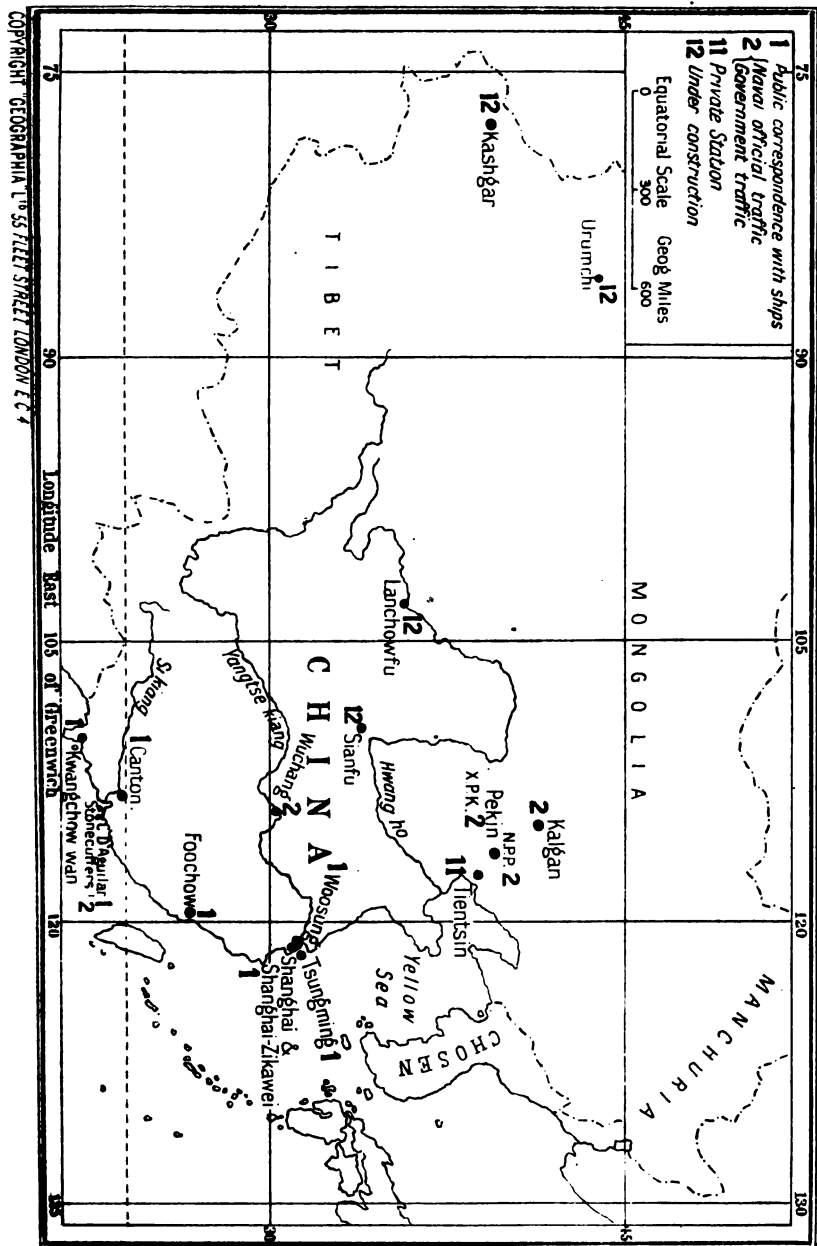
3. The Governor may whenever he shall deem it expedient to do so license the establishment of any wireless telegraph station or

the installation or working of any apparatus for wireless telegraphy in any place in the colony or on board any British ship registered in the colony.

(4). (i) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the colony or on board any British ship registered in the colony except under and in accordance with a licence granted in that behalf by the Governor.

(ii) Every such licence shall be in such form and for such period as the Governor-in-Council may determine and shall contain such terms, conditions, and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (i) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment for



a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(ii) If a magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (i) The Governor-in-Council may make regulations for all or any of the following matters:—

(a) For prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(b) For prescribing the fees payable on the grant of any licence;

(c) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(d) For prohibiting, except with the special or general permission of the Colonial Secretary, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the colony;

(e) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the colony, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(ii) Provided that no regulations made in respect of the matters described in paragraphs (c), (d), and (e) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, con-

ditions, and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (i) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine of five hundred dollars.

(ii) All convictions, forfeitures, and fines under this Ordinance or any regulations made thereunder may be had and recovered before a magistrate.

9. The Wireless Telegraphy Ordinance, 1903, the Wireless Telegraphy Ordinance, 1909, and the Wireless Telegraphy Amendment Ordinance, 1909, are hereby repealed.

B The following regulations were made by the Officer Administering the Government in Council under the provisions of Section 6 of the Wireless Telegraphy Ordinance No. 20 of 1913, on November 20th, 1913:—

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the colony, or on board any British ship registered in the colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—

(a) of the place or ship in respect of which a licence is sought;

(b) of the nature of the apparatus which it is desired and proposed to instal and work; and

(c) of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences:—

(a) For a licence under Section 3 for a land station \$2.50

(b) For a licence under Section 3 for a ship station \$2.50

(c) For an experimental licence under Section 7 Nil

3. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the colony shall be worked in such a way as not to interfere with—

(a) Naval signalling; or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the colony except with the special or general permission in writing of the Colonial Secretary of the colony.

5. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that his

Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. No proceedings shall be taken against any person under these Regulations except with the previous sanction of the Attorney-General.

SHIP LICENCE.

Dated the day of , 19 .

C THE WIRELESS TELEGRAPHY ORDINANCE, 1913. (HONG-KONG.)

His Excellency the Governor of the Colony of Hong-Kong

To.....
Licence to establish Wireless Telegraph Ship
Stations.

TO ALL TO WHOM THESE PRESENTS SHALL
COME I.....

Governor and Commander-in-Chief of the Colony of Hong-Kong and its Dependencies and Vice-Admiral of the same send greeting:

Whereas
(hereinafter called "the licensee") is desirous of establishing installing working and using on a ship or ships belonging to the licensee Wireless Telegraphy as defined in Section 2 of the Wireless Telegraphy Ordinance, 1913:

And whereas by reason of the provisions of the Wireless Telegraphy Ordinance, 1913, it is unlawful to establish any wireless telegraphy station or instal or work any apparatus for wireless telegraphy in any place in the colony or on board any British ship registered in the colony except under and in accordance with a licence granted in that behalf by the Governor:

And whereas at the request of the licensee I have agreed to grant to the licensee the licences powers and authorities hereinafter expressed and contained for the period upon the terms and subject to the stipulations and conditions hereinafter appearing:

Now I the above-named.....

Governor and Commander-in-Chief of the Colony of Hong-Kong and its Dependencies and Vice-Admiral of the same in exercise of all powers and authorities enabling me in this behalf do hereby grant to the licensee during the term or period commencing on the day of the date hereof and terminating on the day of , 19 , and thereafter so long as the Wireless Telegraphy Ordinance, 1913, shall continue in force unless and until these presents and the licence or permission hereby given shall be determined as hereinafter provided licence and permission—

(i) To establish, instal and work for the purposes hereinafter mentioned at the ship station or stations specified in the Schedule hereto apparatus for wireless telegraphy of the kind specified in the Schedule hereto (which apparatus is hereinafter referred to as "the licensed apparatus"):

Provided that—

(a) Each ship station shall be of such class mentioned in Article XIII of the Service Regulations annexed to the Radiotelegraphic Convention, 1912, as is specified in the said Schedule opposite to the name of such station;

(b) The apparatus installed at each ship station shall be of the character specified in the said schedule opposite to the name of such station;

(c) The sending apparatus used at each ship station shall be of such a character that the waves emitted are as pure and as little damped as possible and the receiving apparatus used at the said station or stations shall be of such a character as to afford the greatest possible protection from disturbance during the reception of signals;

(d) The apparatus shall include such emergency installation as may be required according to the class of the ship station under the provisions of Article XI of the Service Regulations annexed to the Radiotelegraphic Convention, 1912;

(e) The licensed apparatus shall be so constructed as to be capable of using wavelengths of 600 and 300 metres in length as measured by the standard of measurement in use by the Government of the Colony for the time being or as may be otherwise directed by the Governor and such other wavelengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Governor; Provided always that the wavelength of 600 metres shall normally be used for communication and further that the wavelength of 1,800 metres may be used in the exceptional case contemplated by Article XXXV (2) (a) of the Service Regulations annexed to the Radiotelegraphic Convention, 1912; Provided further that only the wavelength of 600 metres shall be used by the licensee during the period of any war in which the United Kingdom is engaged;

(f) The apparatus shall admit of the transmission and reception of messages at the rate of not less than 20 words a minute five letters being counted as one word.

(ii) To send and receive messages by means of the licensed apparatus between the said ship stations and also between the said ship stations and coast stations and other ship stations.

Provided that the licensee shall not except with the consent in writing of the Colonial Secretary of the Colony send or receive messages from and at the said ship stations when in any of the harbours of the colony; and

(iii) To receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions:—

1. In these presents (and in the Schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there shall be something either in the subject or context repugnant to such construction (that is to say):—

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Ordinance, 1913.

The term "telegraph" has the same meaning as in the Wireless Telegraphy Ordinance, 1913.

The expression "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether a coast station or a ship station.

The expression "the Admiralty" means the officer of His Majesty's Navy who is for the time being in Hong-Kong in charge of the China Squadron of His Majesty's Eastern Fleet.

The expressions "the International Telegraph Convention" and "the International Telegraph Regulations" mean respectively the International Convention of St. Petersburg, dated the 10th 22nd July, 1875, and the Service Regulations made thereunder and include respectively any modifications of the Convention or regulations made from time to time.

The expression "the Radiotelegraphic Convention, 1912," means the Convention signed at London on the 5th day of July, 1912, and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which has been established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. The licensed apparatus shall not be used by the licensee or by any other person either on behalf of or by permission of the licensee for the transmission or receipt of messages except messages authorised by this licence.

3. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Admiralty is of opinion that the working of the licensed apparatus at any ship station specified in the Schedule hereto is inconsistent with the free use of Naval signalling the licensee shall when required in writing by the Governor so to do close the said station.

(3) These provisions for the protection of Naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. For the purpose of this licence the licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

5. The licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Wireless Telegraphy Ordinance, 1913, by the Governor-in-Council in relation to the conduct of wireless telegraph business so far as the same are applicable to the licensee.

6. The licensee shall observe the provisions of the Radiotelegraphic Convention, 1912.

7. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Governor from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged

by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

8. The licensed apparatus shall not without the consent of the Governor be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

9. The licensee shall at all times indemnify the Governor against all actions claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

10. (1) Subject to the provisions of this licence the licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or preference whether as regards rates of charge, order of transmission or otherwise. Provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

(2) In respect of messages transmitted on behalf of His Majesty's Government the licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

11. The licensee shall so far as possible receive from ships and light stations all request for assistance and all signals of distress and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

12. (1) The licensed apparatus at each of the ship stations mentioned in the Schedule hereto shall be worked only by operators holding certificates issued by the Governor or the Postmaster-General of the United Kingdom or the Government of any self-governing Dominion and the licensee shall provide for the working of each station such operators as are required by the provisions of Article X of the Service Regulations annexed to the Radiotelegraphic Convention, 1912, according to the class of the ship station and shall observe the regulations as to the working of the ship station laid down according to its class by Article XIII of the said Regulations.

(2) A certificate shall not be recognised as authorising the holder to work a ship station under the terms of this licence unless it bears a statement that it is issued by the Governor or the Postmaster-General of the United Kingdom or the Government of any self-governing Dominion in accordance with the Radiotelegraphic Convention, 1912. Such certificates will be valid only during the operation of the said Convention. When issued by the Governor such certificates will be granted to persons of such technical proficiency and will be in such form and will be subject to such conditions as the Governor shall from time to time prescribe and they may be, by whomsoever issued, endorsed or withdrawn at the discretion of the Governor in case of misconduct or breach on the part of the holder of the regulations prescribed for the working of ship stations.

13. The licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus. The licensee shall exhibit at each of the ship stations specified in the Schedule hereto a copy of Section 11 of the

Post Office (Protection) Act, 1884, and any contravention of that section by any person in the employment of the licensee shall be deemed to be a breach of the provisions of this licence entitling the Governor under clause 22 hereof to revoke and determine this licence.

14. The licensee shall keep full accounts records and registers of all messages transmitted by means of the licensed apparatus and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Governor shall from time to time reasonably require to be shown; messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least fifteen months counting from the month following that in which the radiotelegrams were handed in as prescribed by the Radiotelegraphic Convention, 1912, and such registers and message papers shall be open to the inspection of the Governor or his officers thereto authorised at the office of the licensee in Hong-Kong or at such other place as may be agreed between the hours of 10 a.m. and 5 p.m. on every day except Sunday or a general or public holiday.

15. The licensee shall render to the Governor such accounts as the Governor shall direct in respect of all charges, if any, due or payable under the Radiotelegraphic Convention, 1912, in respect of messages exchanged between the ship stations hereby licensed and coast stations and shall pay to the Colonial Treasurer at such times and in such manner as the Governor shall direct all sums which shall be due from the licensee under such accounts.

16. The Governor and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations hereby licensed for the purpose of inspecting and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the working and user of such apparatus and telegraphic instrument respectively.

17. The licensee shall carry on every ship on which a ship station is established under this licence a print or copy of the licence certified under the hand of the Colonial Secretary of the colony of Hong-Kong or appropriate officer of the Postmaster General of the United Kingdom or of the Government of any self-governing Dominion to be a true copy and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls. The licensee shall also carry on every such ship such documents as may be prescribed by the Governor for the purpose of enabling the licensee to communicate with coast stations and ship stations in accordance with the Radiotelegraphic Convention, 1912.

18. (1) The licensee shall pay to the Colonial Treasurer for and in respect of the licence hereby granted a royalty of \$2.50 per annum in respect of each ship station at which the licensed apparatus is installed.

(2) The said royalty shall be payable on the 1st of December in each year during which the licence remains valid.

19. Except with the consent in writing of the

Governor the licensee shall not assign under let or otherwise dispose of or admit any other person or body to participate in the benefit of the licences, powers or authorities hereby granted or any of such licences, powers or authorities.

20. (1) If and whenever an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for any Naval, Military, Customs or Police officer or any other person authorised by the Admiralty to take possession of the licensed apparatus or any part thereof in the name and on behalf of His Majesty and to be used for His Majesty's service and in that event any officer or person so authorised may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid and subject to such use may use the same or allow it to be used for such ordinary services as may in his discretion seem fit to him or may prohibit and take steps to prevent the use of the same and issue directions which shall be obeyed by the licensee to prevent such use.

(2) Any such officer or person so authorised may in such event as aforesaid instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct and such persons may enter upon any ship on which any apparatus is installed accordingly or the said officer or person so authorised may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer or person so authorised may prescribe and the licensee shall obey and conform to all such directions.

(3) The licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

21. At any time after the _____ day of _____, 19____, the Governor may in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby granted at the end of one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Governor under any condition or provision herein contained:

22. In any of the following cases (that is to say):—

(a) In case any sum of money which ought to be paid by the licensee to the Colonial Treasurer under or by virtue of these presents shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained; or

(b) In case of any breach non-observance or non-performance by or on the part of the licensee of any of the provisions (other than a provision for the payment of money) or conditions herein contained;

then and in any such case the Governor may by notice in writing under his seal revoke and

determine these presents and the licences, powers and authorities hereinbefore granted and each and every of them as to all or any of the ship stations hereby licensed and thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease determine and become void as to all or any of the said ship stations (as the case may be) but without prejudice to any right of action or remedy which shall have accrued or shall thereafter accrue to the Governor under any condition or provision herein contained.

23. Nothing in these presents contained shall prejudice or affect the right of the Governor from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Governor from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the colony by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit.

And (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Governor or any other person by or under any Imperial or local enactment or by or under any agreement relating to the transmission of messages by ordinary land and submarine telegraphy.

24. Any notice request or consent (whether expressed in writing or not) to be given by the Governor under these presents may be under the hand of the Colonial Secretary of the Colony of Hong-Kong and may be served by sending the same in a registered letter addressed to the licensee at the usual or last known place of residence or business of the licensee or if such notice request or consent relates to any particular ship station by delivery to the master of the ship upon which such station is installed and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Colonial Secretary of the Colony of Hong-Kong.

As witness my hand and seal this
day of _____ one thousand
nine hundred and _____

THE SCHEDULE OF SHIP STATIONS BEFORE REFERRED TO.

Name of Ship on which Station established.	Class of Ship Station under the Radiotelegraphic Convention, 1912.	Nature of Services Performed.	Hours of Service.	Normal Range of Signalling in Nautical Miles.		Character of Apparatus.		Power.		If Alternator is used, Number of Cycles per Second.
				By Night.	By Day.	System of Radiotelegraphy with the Characteristics of the System of Emission.	Wave-lengths (in Metres).	Source and Maximum Output.	Maximum to be taken in Sending Instruments.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

Signed, Sealed and Delivered by
in the presence of

PERMIT TO WORK AND USE APPARATUS FOR
WIRELESS TELEGRAPHY ON BOARD A
MERCHANT SHIP IN THE HARBOURS OF
THE COLONY.

The Wireless Telegraphy Ordinance, 1913.

Section 6 (1) (iv).

Permission is hereby given for the working and using of apparatus for Wireless Telegraphy on board the ships of the specified in the Schedule hereto whilst such ships are in any of the harbours of the Colony subject nevertheless to the following conditions, namely:—

CONDITIONS.

1. This Permit may be cancelled or suspended at any time by the Governor in his absolute discretion and without any reason being assigned therefor.

2. All such vessels shall obey promptly the "Naval Silence Sign" (— ● ● — ● ● ● ● ● —) and thereupon shall not work or use their wireless telegraphy apparatus until after the "Message Complete Sign" (● ● ● ● ● —) shall have been made.

3. The above company shall render every assistance possible as required by the Postmaster-General by furnishing information in respect of incoming mails carried by the ships of the said company.

4. All information received as to the weather being experienced by the vessels of the said company at sea must be forwarded to the Harbour Office for transmission to the Observa-

tory or sent to the Observatory direct whichever may be the more expeditious. The information should give the date and time of the observation, the position of the ship, the reading of the barometer, the direction and force of the wind, and the state of the sea and weather.

Dated at Hong-Kong, this
day of _____ 19__
Fee \$2 received.

Colonial Secretary.

SCHEDULE.

Colonial Secretary

(B) Weihaiwei.

WEIHAIWEI, a territory in the Shantung district of China, leased by that Republic to Great Britain in 1898, lies in latitude $37^{\circ} 30'$ and longitude $121^{\circ} 40'$ E. The total area comprises 285 square miles.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Sir J. H. Stewart Lockhart, K.C.M.G.	Commissioner of Weihaiwei ..	Government House, Port Edward Weihaiwei.
Mr. A. P. Blunt	Senior District Officer ..	Government Offices, Port Edward Weihaiwei.

ADMINISTRATION.

Wireless Telegraphy in the territory is governed by :

A—Ordinance No. 5 of 1913.

A AN ORDINANCE TO PROVIDE FOR THE
REGULATION OF WIRELESS
TELEGRAPHY.

August 11th, 1913.

BE IT ENACTED by the Commissioner of Weihaiwei as follows :—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."
2. "Telegraph" means an electric, galvanic or magnetic telegraph, and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communications by means of electricity, galvanism, or magnetism. The expression "Wireless Telegraphy" means any system of communication by "telegraph" (as defined in this Ordinance) without the aid of any wire connecting the points from and at which the messages or other communications are sent and received : provided that nothing in this Ordinance shall prevent any person from making or using an electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Commissioner may whenever he shall deem it expedient to do so licence the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the territory or on board any British ship registered in the territory.

4. (i) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the territory or on board any British ship registered in the territory except under and in accordance with a licence granted in that behalf by the Commissioner.

(ii) Every such licence shall be in such form and for such period as the Commissioner may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Commissioner shall consider desirable in the public interest.

5. (i) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Commissioner.

(ii) If a magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Commissioner may make regulations for all or any of the following matters :—

(i) For prescribing the form and manner in which applications for licences under this Ordinance are to be made ;

(ii) For prescribing the fees payable on the grant of any licence ;

(iii) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the territory shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the territory or the waters thereof and

so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(iv) For prohibiting except with the special or general permission of the Commissioner the working or using of any apparatus for wireless telegraphy on board a merchant ship whether British or foreign whilst such ship is in any of the harbours of the territory;

(v) For prohibiting or regulating in case at any time in the opinion of the Commissioner an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships whether British or foreign in the waters of the territory the use of wireless telegraphy on board such ships while in such waters by such further rules as the Commissioner may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii), (iv) and (v) of this section

shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Commissioner that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Commissioner may think proper, but shall not be subject to any rent or royalty.

8. (i) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulations made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of five hundred dollars.

(ii) All convictions, forfeitures and fines under this Ordinance or any regulations made thereunder may be had and recovered before a magistrate.

9. Ordinance No. 1 of 1904 to regulate the establishment of wireless electric telegraphs is hereby repealed.

(2) CHINESE REPUBLIC.

THE Republic of China comprises China Proper (eighteen provinces), Manchuria, Mongolia, Sinkiang, and Tibet. It lies between $18^{\circ} 13'$ and $56^{\circ} 40'$ N. latitude, and between $71^{\circ} 51'$ and $133^{\circ} 52'$ E. longitude. The total area of the eighteen provinces and four dependent territories is estimated at 4,277,170 square miles.

The Republic in its present form was established on October 10th, 1911. The constitution, drafted by the first Parliament, that met on April 8th, 1913, laid down the basis of government under which this great Republic is now governed. The executive power is vested in a President; whilst the legislative authority is exercised by a National Congress, comprising a Senate and a House of Commons.

CONTROL.

Radiotelegraphy in China is owned and controlled by the Government, and its administration is regulated by the Department of Telegraphs, Ministry of Communications. The Ministry of War and the Ministry of Marine control the use of Radiotelegraphy in the Army and the Navy respectively.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Yeh Kun Cho	Minister of Communications	Peking, Chiaotungpu
Tsiang Tsen Yi	Director General (and Chief of the Department) of Telegraphs, Commissioner of Codification of Telegraphy and Telephony, Ministry of Communications	Peking, Chiaotungpu
Lin Tze Sue	Electrical Engineer, Chief of the Traffic Sub-Department, Department of Telegraphs	Peking, Chiaotungpu
Mr. A. H. Eriksen	Adviser and Foreign Chief Superintendent	Peking, Chiaotungpu
Mr. A. Jørgensen	Wireless Engineer and Instructor in Radiotelegraphy at the College of Post and Telegraphy	Peking, Chiaotungpu
Mr. S. T. Dockray	Wireless Engineer	Peking, Chiaotungpu
Admiral Sah Cheng Ping ..	Minister of Navy	Peking, Naval Board
Sü Chen Peng	Vice-Minister of Navy	Peking, Naval Board
Chen En Tao	Chief of the Military Department, Naval Board	Peking, Naval Board
General Chin Yuen Peng ..	Minister of War	Peking, Board of War
Loo Kai Pun	Vice-Minister of War	Peking, Board of War

ORGANISATION.

The coast and inland stations administered by the Ministry of Communications are ten in number, including those of Woosung, Canton, Foochow, Shanghai, Tsungming, Wuchang, Kalgan, and Peking, of which the last five are coast stations open for public service, while the remaining three are official stations. Three new stations of the Marconi type (25 kw.) are being erected at Kashgar, Tihwafu (Urumtsi), and Urga. One 50 kw. station and five 5 kw. stations will be erected in Yunnan Province. These stations will be of the Poulsen type.

It has been proposed to erect several small stations of from 1½ to 5 kw. in Outer Mongolia and at some important points in Chihli Province.

The Naval Board has purchased a very large station of 500 kw. from a Japanese factory. The erection of this station was started in 1920.

A *Radio Training Station* was opened in Peking in 1913. It is controlled by the Ministry of Communications.

ADMINISTRATION.

At present radiotelegraphy in China awaits development and the laws and regulations affecting the subject consist, therefore, of those formulated to govern the working of the ordinary wired telegraph, and telephone, applied, as far as they are applicable, to radiotelegraphy. For this reason we present here a translation of the Chinese general regulations affecting all electrical means of communication, with a few comments emphasising the points which appear to affect wireless telegraphy, and also form of licence for pilot boats.

A—Instructional Order No. 20.

B—Form of Licence for Pilot Boats.

INSTRUCTIONAL ORDER No. 20.

A Dated April 18th, in the fourth year of the Republic of China—i.e., 1915.
REGULATIONS AFFECTING ELECTRICAL MEANS OF COMMUNICATION.

ART. 1.—All telegraphs and telephones, whether wired or wireless, shall be included in the term "Electrical means of Communication."

ART. 2.—All electrical means of communication shall be owned and controlled by the State.

ART. 3.—The following electrical means of communication may be set up by private individuals or corporations after the sanction of the Government has been obtained:

(a) Those established for the exclusive use of railways, mines, or other specific and commercial enterprises.

(b) Those which are set up by individuals or corporations or official departments on their premises for the purpose of establishing connection with a public telegraph office for the convenience of the transaction of the business carried on by the said individuals or corporations.

(c) Those which are used by individuals, corporations, or official departments for intercommunication between various parts of the building in which they are located.

(d) Those which are used by ships *in transitu*.

(e) Those which are set up for the purpose of experiment or research.

(f) Telephones whose calling powers are to be confined within a certain definite area. These must not, however, be erected in any area which is at present furnished with telephonic communication.

[This clause appears to be one intended to apply to future telephone installations and not to any which may be at present

erected. Of the above items it will be noted only (d) and (e) can apply to wireless telegraphy.]

ART. 4.—The Government, in case of necessity, may, in accordance with the provision of Laws and Edicts, seize all private electrical means of communication and convert them to public or military use. When, under the provision of this regulation, the Government so seize and make use of private owned electrical means of communication, it may appoint officials to take charge of and work them.

ART. 5.—When the Government consider it necessary in the interests and for the maintenance of public safety, they can restrict, suspend or cancel any use of electrical means of communication within certain prescribed areas.

ART. 6.—The Superintendent officials at telegraph offices controlled by the Government may suspend the transmission of any message or refuse altogether to accept it, when they consider its contents to be opposed to public safety.

ART. 7.—When special circumstances or *force majeure* cause telegrams to be delayed in transmission or prevent their transmission, the senders cannot claim compensation for damage arising from such delay or hindrance.

ART. 8.—Correspondents are themselves responsible for the contents of their messages.

ART. 9.—With regard to the transmission of telegrams or telephone messages no exemption with regard to liability or responsibility can be entertained on the ground of mental deficiency on the part of the sender.

ART. 10.—Telegrams received at public telegraph offices—other than those specified by Government orders—will be delivered in accordance with the addresses given by the

sender. If, owing to the fact that the address given is incorrect or insufficient, the telegram cannot be delivered, this fact will be publicly announced, and if no application for the message is received within forty-two days from the date of the public announcement, the said message will be destroyed.

ART. 11.—When messages are received in secret code, or in obscure or metaphorical language, the telegraph officials may, if they think fit, call upon the sender to translate the code or elucidate the meaning of the message. If the sender refuses to decode or explain, or, in complying with this request, fail to put the telegraph official truthfully in possession of the real meaning of the message, the official may stop the transmission of the said message.

ART. 12.—Officials, workmen, or messengers engaged in the performance of their duty in connection with telegraphs or telephones are not to be interfered with or stopped by the authorities of the customs or by those operating the canal locks.

ART. 13.—Officials, workmen, or messengers when proceeding in discharge of their official functions are to be allowed unhindered transit over building land and fields (with the exception of those enclosed by walls and gateways) whenever there may be any hindrance to their transit through the regular streets or paths. But if the passage of such officials, workmen, or messengers causes damage to be done to buildings, or to crops in cultivated property, the Government will pay adequate compensation on the application of the owner and on his proof of such damage.

ART. 14.—When officials, workmen or messengers engaged in performing their official functions ask for help or assistance in order to overcome any special hindrance in transit, or when they ask for assistance in climbing mountains or crossing rivers, the persons to whom such request is made may not refuse such help or assistance without assigning adequate reason for so doing. But in the event of such assistance being rendered, the Government will give the person rendering it fit and proper remuneration for such aid and assistance, on his application for such remuneration.

ART. 15.—Telegraph or telephone wires may be set up at convenient places, no matter through what property it is necessary for them to pass; but if their erection involves an encroachment on the rights of others, whether private individuals or corporations, the Government will on application, allot adequate compensation for such encroachment.

ART. 16.—Charges for telegrams and telephone messages shall be collected in cash according to fixed rates.

ART. 17.—Materials used for the purposes of Telegraph and Telephone Services shall be exempted from tax, but not from Customs Duties.

ART. 18.—With reference to the compensation for damage caused, and the right of application for remuneration referred to in the above clauses in connection with the carrying out of Electrical Means of Communication, the period within which such right to compensation or remuneration may be dealt with, and the manner in which it may be so dealt with and adjudicated, shall be regulated by separate "Instructional Orders."

ART. 19.—Any who may offend against Articles 2, 3, 4, 12, 13, and 14, shall be liable

to a fine of from 5 to 200 dollars. Those who offend against Articles 2 and 3 shall, in addition to fines, be liable to confiscation of poles, wires, machines or other apparatus.

ART. 20.—The conditions laid down in Articles 12-19 shall not be applicable to private electrical means of communication, but the specially authorised telephones erected under section (f) or Article 3 may adopt the regulation comprised in Article 16.

ART. 21.—All Laws, Orders or Treaties affecting telegrams between China and Foreign Countries shall have their respective provisions observed and the provisions of this Instructional Order shall not be held to modify or abrogate them.

ART. 22.—These regulations shall come into force immediately on the date of their promulgation.

FORM OF LICENCE FOR PILOT BOATS IN CHINESE WATERS.

B The (hereinafter called "the licensee") is hereby granted licence to operate within the pilot district of the wireless telegraph system installed on board the Pilot Boat , as specified in the schedule hereto for the period commencing the and terminating on the on payment of the sum of ten Mexican dollars, being the licence fee for the privilege above named.

This licence is subject to the following terms, conditions and restrictions:—

1. The licensee shall not establish, instal or operate any apparatus for wireless telegraphy, except the apparatus hereinafter called the "licensed apparatus" specified in the said schedule hereto.

2. The range of signalling shall at no time exceed one hundred nautical miles.

3. The licensee shall use the licensed apparatus solely for the purpose of exchanging with ships at sea messages relating to the safe and prompt working of the licensee's pilot service, and for making or answering calls of distress. However messages originating or terminating on board the aforesaid pilot boat may be exchanged with the Chinese wireless coast stations at on payment of the ordinary charges accruing to the Chinese Telegraph Administration for wireless messages exchanged by means of the said stations. Payment of such charges shall be made in such manner as the Ministry of Communications shall direct.

4. The licensed apparatus shall not be used by the licensee or by any other person either on behalf or by permission of the licensee for the transmission or receipt of messages, except messages authorised under paragraph three.

5. All telegrams exchanged by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose. Such registers as well as the licensed apparatus shall be open to inspection by thereto authorised officers of the Chinese Telegraph Administration.

6. The licensee shall operate the licensed apparatus in accordance with any regulations which may be issued from time to time by the Ministry of Communications.

7. The licensee shall observe the provisions of the International Radiotelegraphic Service Regulations of 1912, as regards transmission

of messages (Article XX—Article XXXIV) in so far as they are not inconsistent with the rights and privileges granted by these presents.

8. The licensee shall so operate the licensed apparatus so as not to interfere with:—

(a) Naval signalling by means of any system of wireless telegraphy between two or more ships of the Chinese Navy or between a ship of the Chinese Navy and any other wireless station, whether on shore or on any ship;

(b) the working of any wireless telegraph station lawfully established, installed, or worked in China or the territorial waters thereof, and in particular the licensed apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations on ships at sea.

9. The licensee shall not work or use the licensed apparatus whilst the boat is in the harbour of _____, except with the special permission in writing of the Ministry of Communications.

10. Regulations 8 and 9 shall, however, not apply to the use of the licensed apparatus for the purpose of making or answering signals of distress.

11. The licensed apparatus shall not, without the consent in writing of the Ministry of Communications, be altered or modified in respect of any particulars mentioned in the schedule hereto.

12. The licensee, in case the aforesaid pilot boat be sold or dispensed with and remain in Chinese waters, shall remove the wireless apparatus before transfer of ownership takes place.

13. The licensee shall operate the licensed apparatus only during the hours indicated on the schedule hereto, except for the purpose of making or answering signals of distress.

14. The licensee shall at all times indemnify the Ministry of Communications against all actions, claims and demands which may be

brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

15. If, and whenever, in the opinion of the Ministry of Communications, the interests of the Government of China demand that the use of the licensed apparatus shall be prohibited or shall be under full control of the said Government, the licensee shall conform to all directions prescribed by the Ministry of Communications.

16. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, the licensee shall be liable for every such breach, non-observance or non-performance to a penalty of one hundred Mexican dollars, and in every such case the Ministry of Communications may, by writing, revoke and determine these presents, and the licence herein granted shall become null and void.

17. This licence or a confirmed duplicate of it shall always be carried on board the aforesaid Pilot Boat.

The Schedule of ship Stations before referred to:—

1. Name of ship on which station established.

2. Nationality.

3. Call signal.

4. Normal range of signalling in nautical miles:—

(a) by day;

(b) by night.

5. Character apparatus:—

(a) Radiotelegraph system with the characteristics of the system of emission;

(b) Wavelengths in metres (the normal wavelength to be underlined).

6. Hours of service.

7. Power:—

(a) Source and maximum output;

(b) Maximum antenna energy.

8. Alternator:—

Number of cycles per second.

COCHIN-CHINA

(See FRANCE.)

COCOS-KEELING ISLANDS

(See STRAITS SETTLEMENTS.)

COLOMBIA

THE Republic of Colombia lies between latitude $2^{\circ} 40'$ S. and $12^{\circ} 25'$ N., its longitude extending from $68^{\circ} 0'$ to $79^{\circ} 0'$ W. Its superficial area is estimated at 461,606 square miles, its population at $5\frac{1}{2}$ millions. The country is intersected by three great ranges of the Andes Mountains known as the Western, Central, and Eastern Cordilleras, the latter of which is the more important as it affords a series of vast table-lands, cool and healthy. Railroads are in their infancy and the telegraphic wiring is estimated at a little under 9,000 miles.

CONTROL.

Control of radiotelegraphy in Colombia is vested in the Minister of the Interior, who is ultimately responsible, whilst the executive authority is wielded by the Minister of Posts and Telegraphs.

ORGANISATION.

The station of Santa Marta was the first wireless installation in the Republic, that of Cartagena being next in order, the most recent being the Government station of San Andres y Providencia. There are six new stations under construction.

ADMINISTRATION.

No special regulations have been issued through the medium of wireless legislation, but in accordance with the current Colombian laws wireless as well as wired telegraphy constitutes a public Service under State control in every way. The Government does, however, in certain special cases grant permission for contracts, under which radiotelegraphic service may be instituted by private companies. As instances of such concessions we may cite the stations of Santa Marta and Cartagena, installed by the "United Fruit Company" and the "Gesellschaft für Drahtlose Telegraphie m.b.H." respectively. The Government only owns and works in the territory of the Republic a single station, located in the Archipelago of San Andres y Providencia, and erected by the last-named company.



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COMMONWEALTH OF AUSTRALIA

(See AUSTRALIA.)

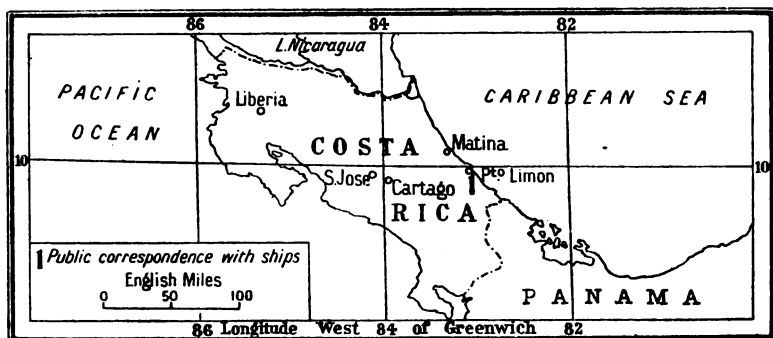
COMORO ISLANDS

(See map on p. 377.)

COOK ISLANDS

(See map on p. 356.)

COSTA RICA



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THE smallest of the Central American Republics, its territory lies between the independent Republic of Panama on the east and that of Nicaragua on the north. In area it covers about 23,000 square miles, and possesses approximately 430,000 inhabitants. According to the latest statistics, there is but one wireless station, situated at Limon, the Atlantic port of the capital, San José. It conducts public correspondence with ships.

CRETE

(See map on p. 251.)

CRETE, or Candia, by which name this interesting and mountainous land is sometimes known, forms the largest of the islands of the Greek archipelago and constitutes part of the island barrier separating the Ægean Sea from the main body of the Mediterranean. Its length is about 140 miles and its breadth averages less than 30.

During the war a wireless apparatus existed in this island for the use of the British Naval and Royal Air Force base at Suda Bay, but this has since been dismantled.

Before the war a site was selected near Mournees in the vicinity of Canea, and the construction of a wireless station was begun under the superintendence of Greek officials sent for the purpose from Athens, but the work was suspended on the outbreak of hostilities. Some time ago eight or nine engineers connected with the Marconi Company, and employed on work at Athens and Smyrna went over and inspected the partial construction. They returned to make their report and it is expected that the station will be completed in the near future.

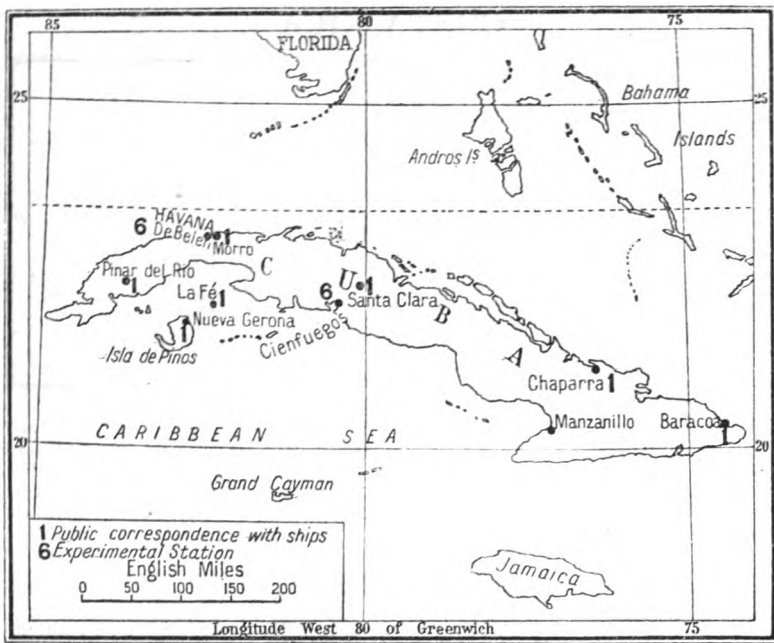
CUBA

THE largest of the islands in the Caribbean Sea, the territory of Cuba occupies an area of about 44,000 square miles—*i.e.*, roughly one-third the size of the United Kingdom. The capital city is Havana, with a population of about 360,000. The country was in Spanish occupation from its discovery until the signature of the Paris Treaty in December, 1898, when it assumed independence. The language of the country, however, remains Spanish.

There are some ten wireless stations in the Republic, open to public correspondence with ships, and their position is shown on the map on page 210.

CONTROL.

The radiotelegraph service in Cuba is controlled by the Government and is carried on under the direction of the Department of Communications.

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OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Sr. Mignel Paniagua	Director-General of the Department of Communications	Havana
Sr. Carlos Barnet	Sub-Director of the Department of Communications	Havana
Sr. Pedro Pablo Torres	Chief of the Division of Technical Inspection	Havana

ORGANISATION.

The radiotelegraph service of Cuba was inaugurated in the year 1906 by the establishment of two small stations installed at the landing places of Mariel and Nueva Gerona, on the Island of Pinos, the said stations being assigned to the handling of internal correspondence.

In 1909 the station of Mariel was abolished and the service extended by the installation of four new stations distributed amongst the ports of Havana, Santiago de Cuba, and the towns of Santa Clara and Camaguey. The four stations were instituted for the rendering of a public service, in general, and they filled a great want in view of the large number of vessels navigating the territorial waters of the Island.

Following the dictates of experience, the stations of Santiago de Cuba, and Camaguey were removed to the coast towns of Chaparra and Baracoa, and a new station was established in the town of Pinar del Rio.

At present seven coast stations exist, all of which are open for public correspondence with ships.

As experimental stations worthy of mention may be cited that of the Colegio Francés (French College) of Cienfuegos, and that of de Belén, of Havana, the latter being assigned to the reception of meteorological signals.

In addition to the coast stations shown in the foregoing statement, the Cuban Government has under its jurisdiction over twenty ship stations installed on vessels of the Navy and merchant vessels belonging to private companies.

ADMINISTRATION.

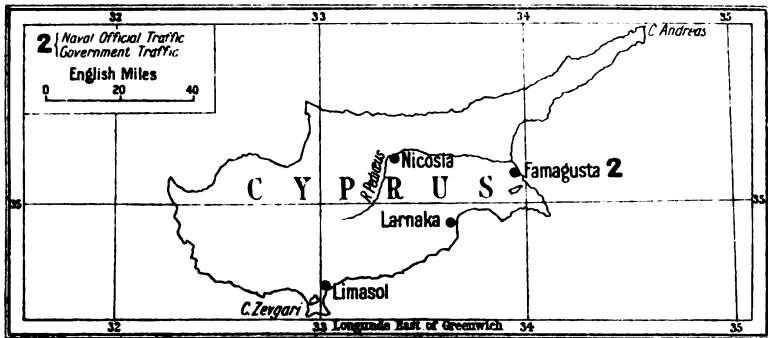
The Cuban Administration adhered to the Radiotelegraph Convention of London in January, 1918; but owing to reasons that are irrelevant here, this adherence was not formalised until February, 1920. For this reason the administrative side of the radiotelegraph service is actually in process of organisation and the laws and regulations by which it will be governed are being studied. It is hoped to include their text in our next edition.

CURAÇAO

(See NETHERLANDS.)

CYPRUS

THE declaration of war upon Turkey by the British Government on November 5th, 1914, released this island from allegiance to the Ottoman Empire, and it was thereupon annexed by Great Britain. Occupying a strong strategical position in the Levant, it proved of immense value to the Allies during the late world conflict. At its shortest distance (to Asia Minor) it lies 35 miles from the mainland, whilst about 50 miles separate it from the nearest point on the Syrian coast. The island constituted the base for several of the Egyptian campaigns, as its climate forms a pleasant and refreshing contrast to the tropical heat of the North African deserts. In area it covers 3,584 square miles. The government of the island is administered by a High Commissioner (appointed by Great Britain) with the advice and consent of the Legislative Council. At present there is one wireless station in the island, situated at Famagusta.



ADMINISTRATION.

The following Act provides for the regulation of wireless telegraphy in Cyprus:—

A—Wireless Telegraphy Law, 1913.

A Law enacted by His Excellency the Officer Administering the Government of the Island of Cyprus, with the advice and consent of the Legislative Council thereof, to provide for the Regulation of Wireless Telegraphy.

A Be it enacted by His Excellency the Officer Administering the Government of the Island of Cyprus, with the

advice and consent of the Legislative Council thereof, as follows:—

1. This Law may be cited as the Wireless Telegraphy Law, 1913.

2. In this Law:—

"Wireless telegraphy" means any system of transmitting messages or other communica-

tions by means of electric galvanic or magnetic signals without the aid of any wire connecting the points from and at which the messages or other communications are sent and received, and includes any apparatus for transmitting or receiving such messages or other communications.

Provided that nothing in this Law shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The High Commissioner in Council may whenever he shall deem it expedient to do so license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in Cyprus or on board any ship registered in Cyprus.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in Cyprus or on board any ship registered in Cyprus except under and in accordance with a licence granted in that behalf by the High Commissioner.

(2) Every such licence shall be in such form and for such period as the High Commissioner in Council may determine and shall contain such terms conditions and restrictions on and subject to which the licence is granted as the High Commissioner in Council shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one hundred pounds or to imprisonment with or without hard labour for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence but no proceedings shall be taken against any person under this Law except with the previous sanction of the King's Advocate.

(2) If a judge of a District Court or of the Supreme Court is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant authorising the person to whom it is addressed to enter and inspect the station place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The High Commissioner in Council may make regulations for all or any of the following matters:—

(a) for prescribing the form and manner in which applications for licences under this Law are to be made;

(b) for prescribing the fees payable on the grant of any licence;

(c) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship of any nationality in the waters of Cyprus shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established installed or worked in Cyprus or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(d) for prohibiting except with the special or general permission of the Island Postmaster the working or using of any apparatus for wireless telegraphy on board a merchant ship of any nationality whilst such ship is in any of the harbours of Cyprus;

(e) for prohibiting or regulating in case at any time in the opinion of the High Commissioner an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships of any nationality in the waters of Cyprus the use of wireless telegraphy on board such ships while in such waters by such further rules as the High Commissioner may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (c), (d) and (e) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the High Commissioner in Council that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms conditions and restrictions as the High Commissioner in Council may think proper but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Law or of any Regulations made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Law and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine not exceeding fifty pounds.

(2) All convictions forfeitures and fines under this Law or any Regulations made thereunder may be had and recovered before a District Court.

9. This Law shall come into operation on the 1st day of July, 1913.

Passed in Council the twenty-third day of May, in the year of Our Lord one thousand nine hundred and thirteen.

CZECHO-SLOVAKIA

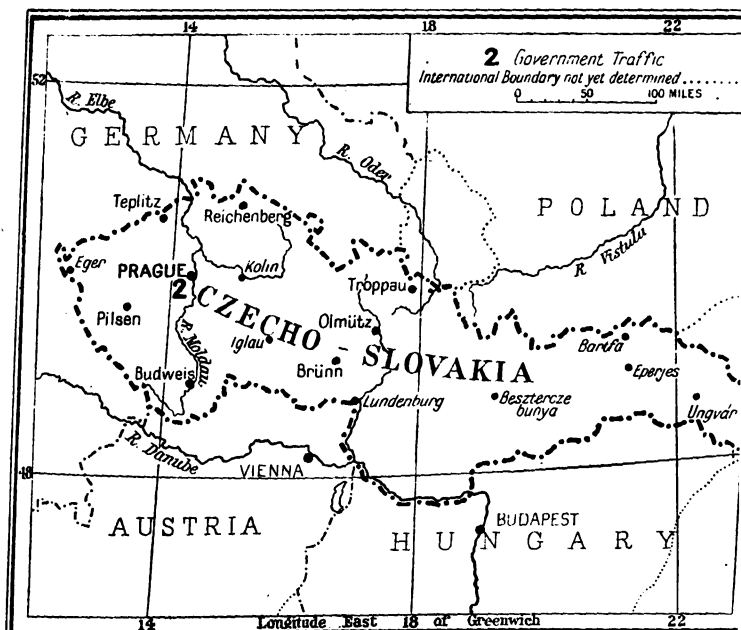
THE Czechs and the Slovaks were fortunate in securing their independence from Austria-Hungary under the terms of the European Peace Treaty. They have in the past been a much oppressed people, and their release from subservience to their former masters must form a source of intense gratification to them and their friends.

Laws and Regulations—Denmark

Conditions have not yet been sufficiently re-established in this territory to permit of our obtaining any particulars in regard to the organisation and administration of radiotelegraphy in that country, but it is hoped to include them in our next year's edition. The annexed map will show the definition of the country's boundaries, and the location of such wireless stations as are known to exist.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. Maximilian Fatka ..	Minister of Posts and Telegraphs ..	Prague
Mr. Emile Breicha.. ..	Director-General of Posts and Telegraphs ..	Prague



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DEMERARA

(See BRITISH GUIANA.)

DENMARK

(See map on p. 350.)

THE area of the Kingdom of Denmark, including the territory added as a result of the recent plebiscite, totals 17,082 square miles. The country is ruled under a Constitutional Monarchy, the Crown of Denmark having been elective from the earliest times.

The territory ruled by King Christian X includes the peninsula of Jutland and several islands in the Baltic Sea, the most important of which are Sealand and Funen; furthermore the Farøe Islands (north of the Shetlands) and

Greenland. The Government is what is called Parliamentary Government, the executive power being vested in the Sovereign (acting through his Ministers), assisted by the Cabinet consisting of ten Secretaries of State and one Minister without portfolio, whose power rests upon the possession of a majority in the Lower House (Folketinget). The Constitution rests on the fundamental law of June 5th, 1849. This fundamental law has, however, been revised by Parliament, was ratified by the King on June 5th, 1915, and became effective on May 6th, 1918.

CONTROL.

Wireless Telegraphy is naturally of considerable importance to a maritime nation like that of the Danes, whose fatherland is at no point any great distance from the sea. It is a Government monopoly, and the administration is supervised by the Minister of Public Works.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. M. Siebsager	Minister of Ways and Communications.	Copenhagen V., Vesterbro-gade 198.
Mr. N. Meyer	Director of Telegraphs	Copenhagen B., Vesterbro-gade 40.42.
Mr. W. Thomsen	Engineer in Chief of the Telegraph Department.	Copenhagen B., Vesterbro-gade 40.
Mr. W. Bjarnov	Chief Engineer, Inspector of Wireless Installations and Instruction.	Copenhagen B., Vesterbro-gade 42.
Mr. H. Schledermann ..	Electrical Engineer in Chief, Royal Danish Navy, Inspector of Wireless Installations and Instruction.	Taffelbays Alle 11, Hellerup.

ORGANISATION.

Originally radiotelegraphy was adopted in Denmark by the Lighting Department (1901) and by the Royal Navy (1902), but later on the commercial use of radiotelegraphy was organised under the supervision of the Telegraph Department and the State Railway Department (both acting under the jurisdiction of the Department of Public Works); the Naval Department and the Lighting Department (both under the Admiralty), and the War Office. These various departments exercise jurisdiction independently over their own radiotelegraphic section.

The first stations erected were those at Blaavandshuk (lighthouse) and on board the Horns Rev (lightship), both of them dating from 1901. The latest available statistics enumerate:—

LAND STATIONS.

- (a) Eight directly controlled by Government (two of them situated in the Faroe Islands).
- (b) One experimental station (Lyngby Radio), belonging to the Telegraph Department (not included under (a)).
- (c) Two instructional stations (Svendborg Radio), with corresponding station Jylland (frigate).

SHIP STATIONS.

- (a) One hundred and twenty-eight with lower power.
- (b) Seventy-three Government vessels.
- (c) Fifty-five private vessels.

No forms of licence for radiotelegraphic working have been issued. The regulations for the erection and operation of private wireless stations are under revision, but it is not yet possible to give details. Laws regarding wireless in its application to aviation are also projected, but so far have not eventuated. The Danish Government contemplates the purchase of a radiotelegraph station for the reception of time and meteorological signals, and of a high power station for transatlantic service.

ADMINISTRATION.

The first Act to regulate radiotelegraphy in Denmark was passed in 1907 (Act No. 99 of April 19th). New regulations became effective on July 1st, 1913. Both are reprinted below.

Special regulations for experimental stations, instructional stations, etc., became effective in August, 1914, and are given *in extenso* below.

A—Act 99 of 1907.

B—Rules dated July, 1913.

C—Regulations for Special Stations.

A The regulations affecting Wireless Telegraphy in Denmark are based upon:

ACT No. 99 OF APRIL 19TH, 1907.

1. The Government shall have the sole right to erect and operate wireless telegraphs (radiotelegraphs) within the Danish boundaries and maritime territory.

2. Telegraph stations on board ships under foreign flag must only be utilised on Danish maritime territory when following the regulations to be drawn up in this respect by the Minister for Public Works. The Minister may prohibit every kind of telegraphic communication from such stations and take the necessary measures to carry through such prohibition, when in his opinion circumstances require it.

3. On board ships under Danish flag, not owned by the Government, telegraphic stations must only be fitted and operated both on and outside Danish maritime territory according to licence previously obtained from the Minister of Public Works. In case the conditions concerning the fitting and working of the station stipulated in the licence are not maintained, the Minister may cancel the licence.

In case it is desired that the working of stations being in operation at the time when the Act comes into force, should be continued, an application to that effect must be filed with the Minister for Public Works not later than four weeks after the Act has come into force, the Minister having then to decide whether and on what conditions the operation of the station may be continued.

4. Scientific and technical trials with wireless telegraphy must be made by no others than the State Authorities unless permission to that effect has been previously obtained from the Minister for Public Works.

5. The regulations stipulated in Act No. 84 of May 11th, 1897, Art. 17, concerning the duty as to secrecy incumbent on the officers and functionaries of the Telegraph Department and concerning the punishment they may be subjected to in the case of a breach of the aforesaid duty, should also be applicable to wireless operators. The regulations stipulate in Art. 18 of the same Act concerning corresponding regulations for employers of private companies may also be made applicable towards operators on board ships.

6. Any contravention of the regulations given in Articles 1—4 shall be punished, provided that the circumstances concerned according to their nature do not inflict a more serious punishment, with forfeiture of the apparatus unlawfully placed and utilised. Furthermore, the contravening person may be liable to a fine of up to 400 kroner, which fine shall devolve to the Treasury. Such contraventions shall be dealt with in the same

way as public police cases. The Minister for Public Works shall be the only person entitled to institute proceedings against contraveners of this Act.

REGULATIONS.

B MADE EFFECTIVE ON JULY 1ST, 1913. In accordance with Act No. 99 of April 19th, 1907, concerning wireless telegraphs (radiotelegraphs) and the International Convention concerning radiotelegraphs drawn up in London on July 5th, 1912, supplemented by appendix decisions, finishing protocol and service regulations, the following decisions shall be observed in founding and working of radiotelegraph stations and in the handling of radiotelegrams:

I.—ESTABLISHING OF RADIOTELEGRAPH STATIONS.

1. On Danish soil and on board ships permanently anchored such as lightships, etc., radiotelegraph stations (coast stations) can only be established by the Government.

2. On board ships under Danish flag, not owned by the Government, radiotelegraph stations (ship stations) may only be established and operated after permission has been previously obtained from the Department of Public Works.

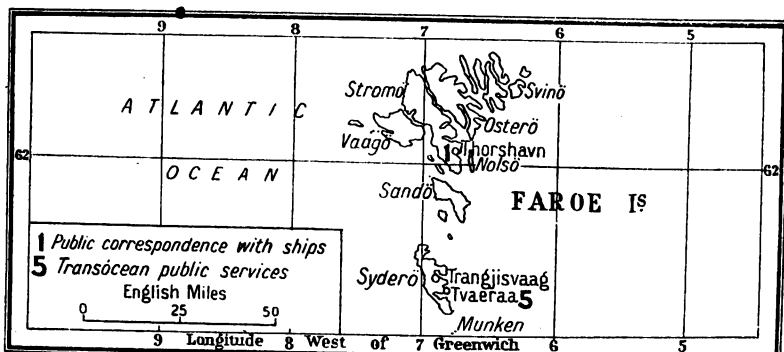
The licence or a certified duplicate of it must always be kept on board the ship.

The licence may be withdrawn if the conditions for the fitting and operation of the station set out therein are not complied with; in such cases the entire apparatus belonging to the station must be removed.

3. Applications for licences to establish and operate radiotelegraph stations on board ships sailing under the Danish flag must be drawn up on forms approved of by the Department of Public Works, delivered and sent in duplicate to the Telegraph Department, and must be supplied with an endorsement to the effect that the station will fulfil the following conditions:

(a) The waves transmitted must be as pure and as little damped as possible; the utilisation of transmitting apparatus, by which the transmitted waves are generated by a direct sparking discharge in the antenna, especially, is only permissible in case of need. This latter arrangement of the transmitter may, however, be permitted in the case of certain special stations (as, for instance, on board small vessels), the primary energy of which does not exceed 50 watt.

(b) The speed of transmission and reception must be no less than twenty words a minute, the word to consist of five letters. New installations utilising an energy of more than 50 watt must be fitted in such a way as to make it easy to obtain more telegraph distances, smaller than the normal ones, the smallest of which should



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be about 15 nautical miles (equal about 28 km.). Old installations utilising an energy of more than 50 watt must be altered, if possible, so as to comply with the regulations mentioned above.

(c) The receiving apparatus, protected in the best possible way against disturbances, must be able to receive signals with the wavelengths of up to 600 m., which are stipulated for the ship station.

(d) The primary energy of the station measured across the generator must under no circumstances exceed 1 kw.

(e) Larger energy than 1 kw. may, however, be utilised, if the ship is to interchange telegrams over a distance of more than 200 nautical miles (equal 370 km.) with the nearest station, or if communication, due to interference is not obtained unless by an increase of the transmitting energy.

(f) The station must be operated by one or more operators who have obtained certificates as specified below in Section 7.

The station must not be opened for communication until the telegraph department has issued a certificate, which will not be granted until the department, by inspection, is satisfied that the conditions set out in the licence granted by the Department of Public Works have been fulfilled.

II—INSTALLATION, SERVICE AND OPERATION OF PRIVATE SHIP STATIONS.

4. The apparatus of ship stations must at any time be in strict accordance with the conditions set out in the licence for their establishment.

5. The hours of service of each coast station are decided by the Government Department.

As far as the hours of service of ship stations are concerned, these stations are divided into the following three classes:

(1) Stations with continuous hours of service;

(2) Stations with limited hours of service; and

(3) Stations with no fixed hours of service. During navigation stations with continuous hours of service must be attended to constantly at the aural apparatus. In the case of stations with limited hours of service the aural apparatus must be attended to during all of the hours of service as well as during the first ten minutes of each hour not comprised in the normal hours of service. Stations with

no fixed hours of service are not obliged to keep any regular watch over the aural apparatus.

The classification of a ship as regards the hours of service of same shall be stated in the licence.

6. Any ship station must be fitted to utilise wavelengths of 600 m. and 300 m. respectively. The normal wavelength is 600 m. Small ships may, however, be allowed to utilise wavelengths of 300 m.; but they must always be able to receive telegrams with a wavelength of 600 m. During the hours of service each ship station must be capable of being called with its normal wavelengths.

Ship stations maintaining continuous watch and ship stations with limited hours of service shall be bound to have a radiotelegraphic spare installation, the single parts of which must be placed as safely as possible. This installation must have a source of energy of its own and must be capable of being put into use quickly, must be able to work satisfactorily for at least six hours and must have a minimal range of:

80 nautical miles (equal to about 150 km.) for ship stations belong to the first class (maintaining continuous watch).

50 nautical miles (equal to about 100 km.) for ship stations belonging to the second class (with limited hours of service).

This special installation is not required in the case of ships, the normal installations of which comply with the requirements of spare installations mentioned above.

7. The service of the ship station must be maintained by operators who are in possession of certificates granted by the Department of Public Works.

In cases of urgent necessity and during one voyage only the service of a ship station may be undertaken by one or more operators holding a certificate from a foreign Government which Government has joined the International Convention concerning radio-telegraphs.

The certificate shall certify

Partly the ability of the operator:

(a) In the maintenance of the apparatus and knowledge of their working.

(b) In the sending and receiving (by sounding) of telegrams with a speed:

(1) No less than twenty words a minute for obtaining a certificate of first class, and

(2) No less than twelve words a minute

for obtaining a certificate of second class.

(c) In the knowledge of the regulations utilised, governing radiotelegraphic service. Partly that the operator shall be bound to secrecy and subject to penalty, etc., for a breach of this condition as in the case of State telegraph operators.

Operators holding a certificate of second class may do service :

(a) On board ships utilising radiotelegraph in their own service or for the correspondence of the crew only.

(b) As assistant operators on board all ships having at least one operator holding a certificate of first class.

Ship stations with continuous service must be operated by at least two operators holding a certificate of first class.

The radiotelegraphic service of the ship stations is placed direct under the master of the ship concerned.

In the event of a contravention of the regulations governing the operation of the radiotelegraphic service, the certificate may be cancelled by the Department of Public Works.

No unauthorised person must be allowed to enter the wireless cabin.

8. If technically possible, ship stations must interchange telegrams with other stations (coast or ship stations), without regard to the system of radiotelegraphy employed at the station concerned. The interchange of telegrams with other ship stations must, however, be so arranged that the working of coast stations is not interfered with, these as a rule having the priority in public telegraph service.

The operation of a station must as far as possible be arranged so that it does not interfere with other stations.

Exchange of superfluous signals and words is prohibited. Experiments and practice shall only be permitted in so far as the service of other stations is not interfered with ; therefore, they must be executed with no other wavelengths than those utilised in the case of public telegram exchange, and utilising as little energy as possible.

When a ship is in a Danish harbour her station must only be utilised for communication with ships in distress.

9. According to the London Convention, the Telegraph Department must notify the Berne Bureau of the ship installation, and the Telegraph Department can demand to be furnished with any information regarding the installation, service, and working of a ship station, both for this and for other purposes.

10. The Telegraph Department will see that all conditions for the fitting and operation of ship stations are complied with. The inspectors for this purpose, who are selected by the Director of Telegraphs, must at any time on showing their authority be admitted to inspect and test the station, provided that the ship is within Danish waters. All information required by the said inspectors must be immediately given, and their directions must be complied with, pending the decision of the Director of Telegraphs, or that of the Department of Public Works.

For the proper carrying out of the inspection the inspectors shall be paid a daily remuneration in addition to travelling expenses ; such amount shall be paid by the Telegraph Department, but will have to be refunded (on demand) by the owners of the ship in question.

III—HANDLING OF RADIOTELEGRAMS.

11. Radiotelegraph stations open for public service for the transmission and reception of telegrams may be used by any person, unless the public telegram exchange at the station in question is limited to a certain special kind of telegrams (see section 14).

The telegrams are divided into three classes :

- (1) State telegrams.
- (2) Service telegrams.
- (3) Private telegrams.

The right to transmit State telegrams and service telegrams, and the right to priority for such messages, is at any time governed by the provisions embodied in the International Telegraph Regulation and the Inland Telegraph Regulation governing the transmission of such telegrams over ordinary telegraph systems.

12. Regarding the radiotelegraph traffic, the handling of telegrams is governed by the International Radiotelegraph Service Regulation, Articles XIV-XV, XIX-XL, XLV-XLIX. The handling of telegrams to and from coast stations and over the ordinary telegraph and telephone system is at any time governed by the Inland and International regulations for such traffic.

13. State and service telegrams may under all conditions be written in code or cypher. Private telegrams in code or cypher may be interchanged only with coast stations of such countries where this method of communication is allowed.

14. The ship station may be licensed for :

Ordinary public telegraph communication.

Limited public telegraph communication (with specified ships, with specified shipping lines, etc.).

Private telegraph communication.

Special telegraph communication (exclusively for State use, etc.).

In the public telegraph communication the following special radiotelegrams are to be received and handled :

- (1) Radiotelegrams with prepaid reply.
- (2) Radiotelegrams (collated telegrams).
- (3) Radiotelegrams to be delivered by express messenger.
- (4) Radiotelegrams to be delivered by post.
- (5) Radiotelegrams with more addresses than one.
- (6) Radiotelegrams with certificate of arrival. Certificates of arrival are handled on lines of telegraphs only.
- (7) Paid service messages, except such as require a repetition or an information.
- (8) Express telegrams, which are, however, only transmitted as such on the ordinary lines of telegraphs and under the proviso that the prescriptions of the International Telegraph Regulations are followed.

All stations are bound to receive, answer, and, if possible, further to communicate messages from ships in distress and give these absolute priority.

Ship stations, however, have no responsibility whatever regarding the radiotelegraph communication.

Ship stations intended for public telegraph service shall get such printed forms, service journals, tariff lists, etc., as are necessary for this service, from the Telegraph Department against payment of fixed amounts. It is the duty of the station to take care that a sufficient supply of these things is always available.

Such stations must furthermore be governed by all the instructions regarding the installation and operation of the station and the handling of the traffic issued by the Telegraph Department.

15. The abbreviations mentioned below covering the terms also mentioned below may be utilised; they are written between two double hyphens before the address, and are charged as one word:

To be delivered to addressee	
only	MP
Delivered open	Ouvert
Private express telegram	Urgent or D
x Addresses	TMx
Reply paid x	RPx
Urgent reply paid x	RPDx
Collation	TC
To be delivered per post	Poste
Télégraphe restant	TR
Poste restante	GP
Post registered	PR
Poste restante registered	GPR
Telegraphic certificate of arrival	PC
Telegraphic urgent certificate of arrival	PCD
Certificate of arrival by post	PCP
Express messenger	Express
All addressed to be stated	CTA

16. The entire charge for radiotelegrams shall include:

(1) Charge for the radiotelegraphic handling, namely:

(a) "Coast fee," which shall devolve on the coast station.

(b) "Ship fee," which shall devolve on the ship station.

(c) "Transit fee," for the coast or ship stations being intermediary stations at the handling of the telegrams.

(2) Charge for handling over the ordinary telegraph and telephone system paid according to the general regulations.

The coast fee for Danish coast stations shall be 15 ctm per word.

The ship fee shall be fixed by the owner of the ship station, subject to the approval of the Department of Public Works. It must not exceed 40 ctm. per word; a minimum charge per telegram may, however, be adopted, not exceeding the charge for ten words. Service telegrams concerning telegrams handled exclusively per radiotelegraph are handled without any charge between the radiotelegraph stations, but are liable to charge when passing lines of telegraphs. Press telegrams at a reduced charge will not be received.

17. The entire charge for the handling of a radiotelegram from the sender to the addressee is to be collected from the sender by the station where it originates. The stations must not collect larger amounts than allowed in the tariffs.

18. All pecuniary liability in consequence of the operation of the ship stations is payable entirely by the owners of the ship in question, without regard to whether the liability in any case may have been due to fault or neglect on the part of the operators.

19. The original radiotelegrams with the vouchers pertaining thereto must, if possible, be sent once a month by the ship stations to the Telegraph Department.

20. Reimbursements of charges paid, and accounts with the Telegraph Department, are governed by the International Radiotelegraph Service Regulation, Articles XLI and XLII.

IV.—OTHER REGULATIONS.

21. Stations on board ship under foreign flags must not be operated during the time such ships are in a Danish harbour, except to receive, answer and forward messages from ships in distress.

22. When the interests of the State require it, the Government may reserve to itself the right to prohibit all radiotelegraphic communication from ships, Danish or foreign, in Danish waters, and to make the necessary regulations to carry through such prohibition.

23. The maximum penalty payable to the State by the owners or radiotelegraphic company concerned for contravening the foregoing regulations is 400 kroner (£22), and all unlawfully fitted or utilised apparatus may be forfeited. Such contraventions are dealt with in the public police court, and proceedings may only be taken according to demand by the Minister for Public Works.

24. These regulations shall come into force on July 1st, 1913.

REGULATIONS

C FOR THE ERECTION AND WORKING OF PRIVATE RADIOTELEGRAPHS

(Experimental Stations; Instructional Stations; Stations to Receive Time Signals, Meteorological Reports, etc., etc.).

1. Licence to establish and operate private radiotelegraphs can only be granted to persons above eighteen years of age, who are Danish subjects and have their residence in Denmark. It is not to be expected that the licence, which cannot be transferred to or utilised by others except in accordance with the consent of the Telegraph Department, be granted, unless it is considered to be of actual value to the person concerned or the scientific or technical development of Wireless Telegraphy or Telephony.

Application for the licence drawn up in duplicate and provided with signature is to be sent to the Telegraph Department; same must contain exact information with regard to the full name, age, residence, previous training, present position, and occupation of the applicant, as well as whether he is a Danish subject or not. The applicant must state exactly the scientific, technical, practical or other purpose for which the erection of the station is intended; furthermore he must send in a diagram of connections for and a description of the projected station as well as particulars about the energy by which the station is intended to work; furthermore the name of the wireless land or ship station or stations with which the station of the applicant wants to communicate.

2. It is under no circumstances allowed to transmit telegrams or messages, unless such telegrams and messages have absolute reference to the radiotelegraphic service of the station concerned.

Signals of distress or messages and enquiries concerning assistance or the like, occasioned by disasters at sea form, however, an exception from the above, the station being bound to receive and immediately retransmit such messages to the proper persons by means of its apparatus or in some other way.

3. Communication, experiments and the like, with other wireless stations outside Danish waters is not allowed unless the consent of the Telegraph Department has been previously obtained.

An application to that effect must contain the name, location and licensee of the foreign land or ship station or stations, with which communication is wanted. A licence, if such one be obtained, does not entitle to communication with other foreign stations than those mentioned in the licence.

4. Stations equipped with transmitters must by no means interfere with the radio-telegraphic communication of other land or ship stations or the public telegraph or telephone traffic. These stations will receive from the Telegraph Department a call signal of their own, and shall answer as soon as this call signal has been observed. Every transmission of signals shall be stopped the moment this is demanded radiotelegraphically or in another way by a Danish wireless land or ship station open to public communication.

5. No transmission of signals must take place until the station has convinced itself that no communication is taking place which might be interfered with by such transmission.

6. The station is liable to be a client of the local telephone net of the place, so that telephonic connection with it can be obtained quickly.

7. The licensee and those persons who are allowed to use the stations out of actual instructional purposes must sign a declaration to the effect that they bind themselves to keep secret the contents of such wireless telegrams as might be brought to their knowledge through the wireless station.

These declarations shall be written on special forms, which latter are to be sent to the Telegraph Department duly filled in and signed.

8. In the case of stations equipped with transmitting apparatus, the licensee must be familiar with and strictly maintain the Regulations of the International Radiotelegraph Convention and the Service Regulations annexed thereto, in so far as these regulations have reference to the station concerned.

9. Stations equipped with both transmitting and receiving apparatus, which have not been expressly mentioned in the licence as experimental stations, must use in general no other wavelengths than 200 metres and below. Should it turn out to be necessary—in order to obtain the purposes intended for the erection of the station—to use larger wavelengths than the above mentioned, the station shall be exclusively worked by such wireless operators as are holders of a certificate of first or second class as prescribed according to the notification of the Department of Public Works of June 27th, 1913. The transmission of signals over wavelengths from 600 to 1,800 metres inclusive will entail an immediate withdrawal of the licence.

10. The stations mentioned in Article 9 shall generally not use a larger primary energy than $\frac{1}{4}$ kw. Should the utilisation of a larger energy than the above turn out to be necessary in order to obtain the purpose intended for the erection of the station, the working of same be undertaken by a trained wireless operator as mentioned in Article 9.

It is necessary that the primary energy of the station can be read from permanently installed meters.

The utilisation of transmitting apparatus by which the generation of the transmitted waves takes place by direct discharge of sparks in the antenna is not allowed.

11. Receiving stations, which shall receive nothing but signals (time signals, meteorological reports, and the like) shall be arranged in such a way as to be able to receive at most only two wavelengths; they shall be arranged in such a way that the licensee can only vary the tuning very little from the wavelength or wavelengths fixed, and the deviation from one wavelength must not exceed five per cent. up or down.

The receiving apparatus shall be enclosed in a case in such a way that it can be worked from the outside only by the handle of the tuning contrivance. The shifting of detector and telephone shall, however, take place without it being necessary to open the case, which is to be plumbed by an inspector from the Telegraph Department.

With the exception of the coupling of the detector and telephone, the remaining connections of the receiver—also the connections from the aerial net and water or earth—shall be carried out inside the plumbed case and made so immovable (by soldering together) that a change of the tuning beyond the permissible limits cannot take place.

Later couplings of connections or tuning arrangements are not allowed.

12. When the station is not used and cannot be called, the aerial net (the antenna) must be put direct to a good water or earth connection.

13. The station must not be used until it has been examined by an inspector from the Telegraph Department. If the examination has turned out to be favourable the licensee will receive from the Telegraph Department an information in writing to the effect that the station may be used. An amount of Kr. 10.00 is to be paid for the examination, together with the travelling expenses of the inspector. The amount is to be paid to the Telegraph Department as per bill.

14. Produced under the authority of the Telegraph Department it will be examined as often as is deemed necessary, whether or not the provisions prescribed for the utilisation of the station are maintained; in general this examination will take place once a year. The expenses in connection with this examination to be paid by the licensee in accordance with the same rules as are mentioned in Article 13.

15. The installations of the stations shall satisfy the provisions being at any time in force for the establishment of similar electric plants, and the necessary notices of warning shall be placarded on all places accessible to strangers. When the plant of a station undergoes a change of some importance, this shall immediately be brought to the knowledge of the Telegraph Department.

16. It is exclusively incumbent on the licensee to pay any damage caused by the plant of the station (apparatus and aerial net) to a person or his property.

17. The conditions prescribed for obtaining a licence to establish and work a station can at any time be supplemented and changed should circumstances make it necessary.

18. The licence to work a station can be withdrawn at any time and without notice. This will always happen, in case the above conditions for obtaining a licence be not strictly maintained, and the licensee has no right to claim any compensation for the withdrawal of the licence. If the licence be withdrawn the licensee shall—under penalty

pursuant to Act No. 99 of April 19th, 1907, section 6—immediately remove all of the apparatus and antennæ of the station.

Every abuse of the station, every transmission of false signals, or the fact that strangers gain admittance to use the trans-

mitting apparatus of the station, will entail a withdrawal of the licence granted. In such case the offender might even be liable to penalty.

THE TELEGRAPH DEPARTMENT.

August, 1914.

DOMINICA (B.W.I.)

(See LEEWARD ISLANDS.)

DOMINICAN REPUBLIC

(See SANTO DOMINGO.)

DUTCH EAST INDIES

(See NETHERLANDS.)

EAST AFRICAN PROTECTORATE

(See KENYALAND COLONY.)

ECUADOR

THE Republic of Ecuador comprises the provinces which formed the ancient Presidency of Quito, the Colon Archipelago (Galapagos Islands) and the so-called Orient Territory. The fifteen provinces have a total area of 55,000 square miles, that of the Archipelago being 2,900 square miles. The Orient Territory is largely unexplored, and its boundaries are in dispute. Its inclusion makes the total area of Ecuador anywhere between 160,000 and 270,000 square miles. No complete census has ever been taken, but it is estimated that the present population is about 2,000,000.

The Government of Ecuador, according to the Political Constitution of 1830, is republican, representative and democratic. It is composed of the Legislature, the Executive and the Judicature. The Legislature, or National Congress, comprises the Senate and the Chamber of Deputies. The Executive is wielded by the President of the Republic, who is elected by popular vote every four years, and who is responsible for the appointment of the Ministers of State, Governors of Provinces, etc. The Judicature is exercised by the Supreme Court, High Courts, and other tribunals established according to the Constitution.

CONTROL AND ORGANISATION.

Up to the present there has been no legislation affecting wireless telegraphy. There is consequently no Government control over the installation of wireless stations, provided that no commercial service is carried on. The latter is the prerogative of the State.

Officers and men in the Guayaquil artillery school are put through a comprehensive course in radiotelegraphy with the aid of laboratory apparatus.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Dr. Don Carlos Tobar y Borgoño ..	Minister for Foreign Affairs.	Quito
Señor Don Guillermo Destruge ..	Director-General of Telegraphs	Do.

The first wireless telegraph station was installed in 1913 at Guayaquil by Señor Don Geo. Chambers Vivero, Captain of the Port, for the purpose of communicating with vessels navigating in the Guayaquil River. It has a range of about 80 miles. The Marconi Company has recently completed a station at Santa Elena Point having a range of over 500 miles.

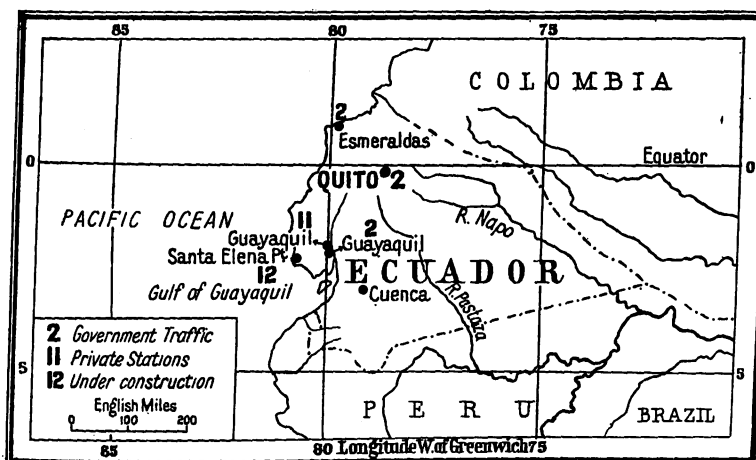
Two 10 kilowatt stations have been placed at Quito and Guayaquil, and a 5 kilowatt station is installed at Esmeraldas. The antennæ are of the umbrella type of a hundred metres. The transmission waves are of 1,800

metres, in order to facilitate communication across the mountains, but stations will eventually work with a 600-metre wave for communication with ships.

The Marconi Company has a 5 kilowatt station which is not yet in public service, but which will shortly be utilised, by virtue of an agreement which it is hoped will be concluded shortly.

At present these stations are merely strategical, and for the Navy. In view, however, of the progress made by wireless telegraphy, as regards reliability and speed, work is proceeding in the direction of creating a permanent interior system, which, having regard to the mountainous nature and small population of the country, shall ensure a continuous service which will advantageously and economically supplement the present wire telegraph system, which is always so liable to accidents, with consequent paralysis of traffic.

Furthermore, aviation, which sooner or later will become more general, demands that an efficient wireless system shall be created for the rapid



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transmission of meteorological information in all parts of the country. The progress of aviation is bound up with that of wireless telegraphy.

Communication is projected between the Galapagos Islands and the continent. A station will be placed at a point on the coast which shall permit of exterior communication. All these matters are receiving consideration and the hope is felt that they will be realised.

The stations of Quito and Guayaquil have been adapted for a system which is capable of effecting an efficient and permanent service, as apparatus exists which has recently been tested and found adequate to ensure this class of permanent service, notwithstanding the difficulties of territory and atmosphere; these questions are of great importance in view of the geographical position of the country. As the traffic develops, small stations will be established in towns of lesser importance.

The question of wireless telegraphy in Ecuador is receiving consideration from the technical and economical points of view; that is to say, due account will be taken of the country's requirements and resources. With regard to all these questions, the wave system will have to be considered. At certain points the service will be performed by the use of the damped wave and some stations will be transformed to work with both classes of wave. For example, a coast station will have to work not only with ships but also with

all the stations in the interior of the country. Further, the simultaneous working of all stations demands a variety of system between them all, and this will call for the most rigid organisation. The present state of wireless telegraphy will enable all this to be realised, and in the future communication will be effected by this means with the most distant points.

EGYPT

KNOWN by the Arabic-speaking peoples of the world as "Masr," Egypt was proclaimed a British Protectorate on December 18th, 1914, shortly after the declaration of war on Turkey. The inhabited portion of the country is practically wholly comprised within the valley of the Nile and its delta, a few nomadic tribes living in the large desert wastes lying to the west and east of that remarkable river. The cultivable area of Egypt is computed at about 8,006,000 feddans (a feddan is a little more than an acre).

CONTROL.

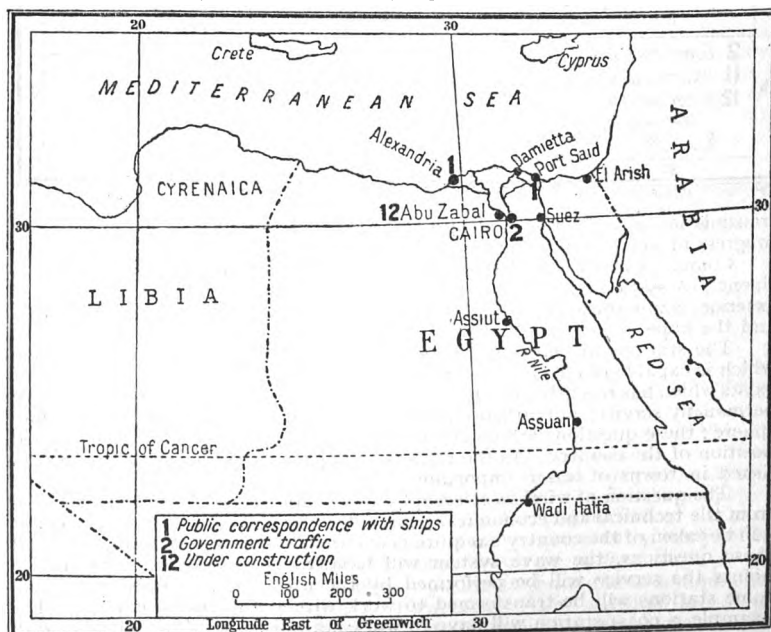
Wireless Telegraphy forms a branch of the Ministry of Communications and is controlled by the State Telegraph Department of that Ministry. The following is the position in regard to land stations :—

Public service to ships	2
Government traffic only	1
Under construction	1

ADMINISTRATION.

Wireless Telegraphy is a State monopoly in accordance with the following Khedivial Decree dated May 12th, 1906 :—

1. Wireless Telegraphy shall be a State monopoly and no installation shall be established or used except by the Government or
- with the sanction of the Government.
2. The Minister of Public Works shall be responsible for the administration of this law.



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ERYTREA

(See ITALY.)

FALKLAND ISLANDS

THIS is a Crown Colony situated in the South Atlantic, 300 miles east of the Magellan Straits. The area covers 6,500 square miles, besides South Georgia, 1,000 square miles (estimated), and there are several dependencies:—e.g., the South Shetlands, South Orkneys, Sandwich Group, and Graham's Land.

The Administration is conducted by the Governor, assisted by an Executive Council and a Legislative Council. There are two stations conducting public correspondence with ships.

ADMINISTRATION.

Radiotelegraphy is administered under the following Act:—

WIRELESS ORDINANCE.

DATED MARCH 15TH, 1912.

The following Ordinance relating to wireless telegraphy came into force on March 15th, 1912:

1. No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor in Council.

2. No person shall work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor in Council, and the Governor in Council may, by any such regulations, impose penalties, recoverable before a Stipendiary Magistrate or any two Justices of the Peace in a summary manner, for the breach of any such regulations, not exceeding twenty pounds each for offence, and may provide for the forfeiture of any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

3. If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be guilty of a misdemeanour and be liable on summary conviction thereof to a penalty not exceeding twenty pounds or to imprisonment not exceeding three months and, on conviction in the Supreme Court,

to a fine not exceeding one hundred pounds, or to imprisonment for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

4. If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under this Ordinance, he may grant a search warrant to any constable or to any officer appointed in that behalf by the Governor and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place, or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy.

5. The expression "wireless telegraphy" means any communication by telegraphy without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

6. The Wireless Telegraph Ordinance, 1903, is hereby repealed.

7. This Ordinance may be cited as the Wireless Telegraph Ordinance 1912.

FARÖE ISLANDS

(See DENMARK.)

FIJI ISLANDS

(See map on p. 356.)

ABOUT 1,100 miles north of New Zealand lie some 200 to 250 islands (a few merely bare and uninhabited rocks), which cover a square of the South Pacific Ocean about 300 miles each way and constitute the British Colony of Fiji. Their latitude lies from $15^{\circ} 45'$ to $21^{\circ} 10'$ S.; whilst their longitude stretches from $176^{\circ} 0'$ E. to $178^{\circ} 0'$ W. The gross area of the group amounts to about 7,435 square miles.

The administration is that of a British Crown Colony, the Governor being assisted by an Executive Council of six and a Legislative Council of twenty members.

CONTROL.

The four wireless telegraph stations in Fiji are owned and worked by the Colonial Government through the department of Telegraphs and Telephones.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
C. C. F. Monckton, M.I.E.E. ..	Superintendent of Telegraphs and Telephones..	Suva
W. G. Covell, A.M.I.E.E. ..	Assistant Engineer	Suva
W. Kearsley	Wireless Operators in Charge of Stations. ..	—
R. C. Farquhar		
H. Roffey		
K. Lawry		
J. R. Land	Assistant Wireless Operators	—
A. O. Barrack		
K. W. A. Black		
F. Thomas		
T. J. Davis	Accountant	Suva

Stations.—Suvaradio, Labasaradio, Taviuniradio, and Savusavuradio.

There are no aviation or ship stations licensed in Fiji. Licences have recently been granted for privately owned experimental stations to two members of the Fiji Defence Force, one situated at Lautoka, the other at Sigatoka. The colony possesses no wireless clubs or societies.

ORGANISATION.

The first Wireless Telegraph Ordinance was passed in 1903. This was revoked by Ordinance No. XXV of 1912 (printed in the YEAR BOOK for 1917), which was in turn revoked by Ordinance V of 1913. New regulations were made in 1917, which have since been revoked, and the original regulations made in 1913 are now in force.

No licences for wireless telegraph working have been issued since 1914. There are no stations existing or projected for aviation or meteorological purposes.

ADMINISTRATION.

The following pages contain the text of:—

A—Ordinance No. V of 1913.

B—Schedule based thereon.

C—Form of Experiment Licence.

AN ORDINANCE TO PROVIDE FOR THE REGULATION OF WIRELESS TELEGRAPHY.

Dated June 19th, 1913.

A Be it enacted by the Governor with the advice and consent of the Legislative Council as follows:—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. In this Ordinance "wireless telegraphy" means any system of communication by tele-

graph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any

apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under or in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such purpose as the Governor may determine and shall contain the terms conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship whether British or foreign while that ship is in the territorial waters of the Colony otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor may from time to time make regulations for carrying into effect the purposes of this ordinance and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a stipendiary magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance he may grant a search warrant to any officer of constabulary or any person appointed in that behalf by the Inspector-General of Constabulary and named in the warrant and a warrant so granted shall authorise the officer of constabulary or person named therein to enter and inspect the station place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds and upon such conviction the court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before a stipendiary magistrate on the complaint of the Inspector-General of Constabulary or of any person thereto authorised by him in writing and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphy Ordinance 1912 is hereby repealed.

Passed in Council this twenty-sixth day of

May in the year of our Lord one thousand nine hundred and thirteen.

SCHEDULE.

REGULATIONS.

B (i) All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with:—

(a) Naval signalling; or

(b) the working of any wireless telegraph station lawfully established installed or worked in the Colony or the territorial waters thereof and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(ii) In these regulations "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

(iii) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

(iv) For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(v) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

(vi) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

LICENCE TO USE WIRELESS TELEGRAPHY FOR EXPERIMENTAL PURPOSES, GRANTED BY THE GOVERNOR IN PURSUANCE OF SECTION 3 OF ORDINANCE No. V OF 1913.

C Licence is hereby granted to ^{of} (hereinafter called the licensee), subject to the conditions hereinafter contained during the term or period commencing on the and terminating on the day of

(i) to establish, instal and work at the station specified in the Schedule hereto apparatus for wireless telegraphy (hereinafter called "the licensed apparatus") provided that the apparatus installed at such station shall be of the character specified in the said Schedule opposite to the name of such station; and

(ii) to transmit and receive messages by means of wireless telegraphy at the said stations.

Provided that the licensed apparatus shall be worked and the messages shall be transmitted and received solely for the purpose of conducting

experiments in wireless telegraphy and for no other purpose whatever.

2. The licensed apparatus shall not be used by the licensee or by any other person either on his behalf or by his permission for any purpose except for the purpose of conducting experiments in wireless telegraphy.

3. (1) The licensed apparatus shall be so worked as not to interfere with the working of any wireless telegraph station established in the Colony of Fiji or the territorial waters abutting on the coasts of the Fiji Islands by or for the purpose of the Government of Fiji or any department of His Majesty's Government or for commercial purposes and in particular with the transmission or receipt of any messages between or at wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) With a view to preventing such interference as aforesaid the licensee and any person acting on his behalf or by his permission shall comply with all directions which shall be given to the licensee by the Colonial Secretary or prescribed by the Colonial Secretary with respect to avoiding interference between one wireless telegraph station and another.

(3) The licensed apparatus shall not without the consent in writing of the Colonial Secretary be altered in respect of any of the particulars mentioned in the Schedule hereto.

(4) The licensee shall at all times indemnify the Government against all actions, claims and demands which may be brought or made by any corporation, company, or person in respect of any injury arising from any act, licensed or permitted, by these presents.

4. (1) The licensee shall not (either by himself or by any person acting on his behalf or by his permission) by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus, interfere with naval signalling.

(2) Whenever the operators at any of the said stations of the licensee perceive through the medium of the instruments used by them that naval signalling is proceeding, they shall refrain from using the licensed apparatus until all indication that naval signalling is proceeding shall have ceased.

(3) The licensee and any person acting on his behalf or by his permission shall, if so required, in writing by the Colonial Secretary cease to use the licensed apparatus for such period (not exceeding . . . hours in any one day) as may be specified by the Admiralty.

(4) If the Governor is of opinion that the working of the licensed apparatus at any station specified in the Schedule hereto is inconsistent with the free use of naval signalling the licensee shall when required in writing by the Colonial Secretary close the said station.

(5) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this Indenture.

5. Neither the licensee nor any person on his behalf or by his permission shall divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee or any such person as aforesaid and transmitted by naval signalling or by any system of wireless telegraphy provided or maintained by or for the purpose of the Government

of Fiji, or by any licensee of the Colonial Secretary (other than the licensee).

6. The Superintendent of Telegraphs and Telephones and his engineers, agents and assistants may, from time to time, and at all reasonable times, enter upon or any of the stations or other premises in the possession or occupation of the licensee either solely or jointly with any other person or persons for the purpose of inspecting and may inspect any apparatus fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively, and the working and user of such apparatus and telegraphic instruments respectively, and the licensee shall afford all requisite and proper facilities for such inspection and shall secure to the said Superintendent the right for the purpose aforesaid of entry from time to time and on such of the said stations and premises as may be in the possession or occupation of any person or persons other than the licensee.

7. (1) All apparatus used or intended to be used under this licence shall be so erected, fixed, placed and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance, working or user of any telegraphic line of the Government which may from time to time exist or which it is probable that the Government may have occasion to erect, place, fix or use or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or user thereof.

(2) In case any telegraphic line of the Government shall be damaged or the efficient working or user thereof shall be wholly or partially interrupted or otherwise interfered with and the Superintendent of Telegraphs and Telephones for the time being shall certify in writing under his hand that such damage, interruption or interference has been caused directly or indirectly by any apparatus used or intended to be used under this licence or by anything done by on behalf or with the permission of the licensee in relation thereto the licensee shall on demand pay to the Colonial Secretary all costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraphic line so as to restore the same to efficient working order, and in adding thereto or substituting therefor either temporarily or permanently any other telegraphic line if the said engineer shall certify that such addition or substitution is reasonably required.

8. Except with the consent in writing of the Colonial Secretary the licensee shall not assign, underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences, powers or authorities hereby granted or any of such licences, powers or authorities.

9. If and whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the Governor by warrant under his hand to direct and cause so much of the licensed apparatus as is within the Colony of Fiji or the territorial waters thereof or any part of the licensed apparatus to be taken possession of in the

name and on behalf of His Majesty and to be used for His Majesty's service and in that event any person authorised by the Governor may enter upon stations specified in the Schedule hereto or any of them and take possession thereof and use the same as aforesaid.

10. The Colonial Secretary may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby given at the end of one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Colonial Secretary under any covenant or provision herein contained on the part of the licensee to be observed and performed.

11. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the covenants or conditions herein contained and on the part of the licensee to be observed and performed the Colonial Secretary may in writing revoke and determine those presents and the licensed powers and authorities hereinbefore granted and each and every of them, and thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

Provided always that no such revocation or determination as aforesaid shall prejudice or affect any right of action or remedy which shall have accrued or shall thereafter accrue to either of the parties hereto under the covenants herein contained.

12. Nothing in these presents shall prejudice or affect the right of the Governor from time to time to establish, extend, maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect

the right of the Governor from time to time to enter into agreement for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the Colony of Fiji by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit.

13. Any notice, request or consent (whether expressed to be in writing or not) to be given to the licensee under these presents may be served by sending the same by registered letter addressed to the licensee and any notice to be given by the licensee under these presents may be served by sending the same by registered letter addressed to the Colonial Secretary.

By Command,

Colonial Secretary.

Given under my hand this day of

THE SCHEDULE BEFORE REFERRED TO :

Name of Station.	Character of Apparatus.		
	Maximum range of signalling with the Licensee's	Power (Current and Voltage).	Source of Power.

FINLAND

(See map on page 389.)

THIS country is still in far too unsettled a state for us to be able to obtain the text of any laws and regulations which may exist in regard to wireless telegraphy, but we hope by the time our next edition is in course of preparation that normal conditions will be sufficiently re-established to enable our doing so.

As far as can be ascertained now, there are two wireless stations under construction near Helsingfors.

FORMOSA

(See JAPAN.)

FRANCE

(Including Algeria and Tunis.)

(For other Colonies of France, see page 237.)

FRANCE is the most westerly of Central European countries. In latitude it lies between 40° 29' and 51° 5' N.; in longitude between 7° 45' E. and 4° 45' W. The area of its 87 departments (including the Isle of Corsica) is estimated at 207,076 square miles.

Its colonial possessions (including Algeria and Tunis) cover a total area of 4,084,410 square miles. Of these Algeria (French since 1830) is reckoned as an integral part of France, the rest being governed as protec-

H2

torates. Tunis has been a French Protectorate since 1881. The area of French Africa alone is reckoned at 3,812,000 square miles.

CONTROL.

Radiotelegraphy in France is a State monopoly.

The commercial use of wireless telegraphy in France, Algeria and Tunis has been placed under the control of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs. The Department of Telegraphs deals with all matters relating to the administration of commercial wireless telegraphy, and this Department also controls inland and foreign telegraphs. The Ministry of War and the Ministry of Marine control the use of wireless telegraphy in the Army and Navy respectively.

As far as the large high-power radiotelegraph stations of France are concerned they are under the jurisdiction of different Government Departments, as follows:—

Eiffel Tower ..	..	Ministry of War.
Basse-Lande (Nantes) ..	..	Ministry of Marine.
La Doua (Lyons) ..	..	These two stations, erected by the War Department, will be worked by the Administration of Posts and Telegraphs, for Public Service, and in principle for communication with the stations of the French Inter-Colonial districts.
Croix d'Hins (Bordeaux)	..	

With regard to the other French Colonies, the service in each is organised under a decree of the respective Governors of those Colonies. We append a general note affecting radiotelegraphy in these Colonies, which will be found at the end of this section.

The statistics (December 31st, 1919) as to the number of stations in France and Colonies are:—

	<i>Coast.</i>	<i>Ship.</i>	<i>Internal Communication.</i>	<i>Total.</i>
France and Algeria	20	349	—	369
French Equatorial Africa	1	—	—	1
French West Africa	5	—	—	5
Indo-China	4	—	—	4
Madagascar	4	—	—	4
Tunis	2	—	—	2
Other French Colonies	4	—	—	4
Grand Total .. ..	.. ..			389

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
M. le Capt. de Vaisseau Lagorio ..	Directeur du Service de la Télégraphie sans Fil	Sous-Secrétariat d'État des Postes et Télégraphes, Paris.
M. Gabriel Lippmann	Président of the Inter-Ministerial Commission on Wireless Telegraphy	Do.

ORGANISATION.

Since June 5th last commercial traffic has been opened with Budapest and Belgrade through the Eiffel Tower; with the United States of America a provisional service has been established between the stations of Lyons and Annapolis. The Lyons Station also communicates with Rufisque (French West Africa) and Brazzaville (French Equatorial Africa).

ADMINISTRATION.

Licences for the erection and maintenance of ship stations are issued to steamship companies. The form of such licences and the contract indicating the conditions under which is accorded authorisation to instal wireless telegraphy on board ships will be found below.

The administration of radiotelegraphy is governed by the following enactments, supplemented by a Form of Ship's Licence :—

A—Decree, dated March 5th, 1907 (modified by subsequent enactments).

B—Decree, dated February 24th, 1917.

C—Decree, dated December 15th, 1917 (modified by Decrees of May 15th, 1919, and March 21st, 1920).

D—Form of Ship's Licence.

E—Law of July 31st, 1919.

F—Administrative Order, dated February 27th, 1920, regulating Wireless Time and Meteorological Signals.

G—Law of August 9th, 1920.

H—Decree of August 26th, 1920.

A The following is the Decree dated March 5th, 1907 (modified and completed by the following decrees) : April 26th, 1910; February 5th, 1911; May 27th, 1911; November 20th, 1911; July 31st, 1919, which superseded the decrees of February, 1903, and February 27th, 1904 :—

ART. 1.—All wireless telegraph stations in France, in Algeria and in the Colonies are in times of peace worked by the Administration of Posts and Telegraphs with the exception of :—

(a) Coast stations communicating with warships and naval establishments ashore.

(b) Stations on military territory, or engaged solely on military work.

(c) Stations which are purely military in character and which in times of peace are only occupied in periodically exchanging practice telegrams.

(d) Special stations on lighthouses and buoys.

(e) Stations erected for internal communication, either within the boundaries of any one territory, or to communicate between two neighbouring territories, two groups of neighbouring territories, and a colony, or a group of colonies, with a neighbouring foreign country always providing, of course, that for other than local communication (which would be exceptionally allowed).

Questions of contract and tariff would be regulated between the departments concerned (Ministry of the Colonies), Administration of Posts and Telegraphs and, if existing, Ministry of Foreign Affairs.

Any deviation from this rule will form the subject of discussion between the Ministries concerned.

ART. 2.—In the event of mobilisation all radiotelegraphic stations, without exception automatically fall under the authority of the Ministries of War and of the Navy.

In case of mobilisation the Ministries of Marine and War shall automatically assume control of all stations, without exception.

3. The choice of sites for the proposed range of a station and all technical conditions applicable to each projected station shall be submitted for the consideration of an Inter-ministerial Commission formed in accordance with Article 4 of this Decree. The function of this Commission is to study the various aspects

of the services to be carried on and to indicate to the Administrative Departments affected the conditions that are necessary to reconcile their respective interests.

4. The Inter-ministerial Commission shall be appointed by the Minister of Public Works, Posts and Telegraphs, and shall comprise the following members :—

One President and one Vice-President appointed by Presidential decree from the Departments interested.

Three representatives from the Ministry of Marine.

Three representatives from the Ministry of War.

Two representatives from the Colonial Office.

One representative from the Foreign Office.

One representative from the Ministry of Commerce and Industry.

Four representatives from the Ministry of Public Works.

Three representatives from the Administration of Posts and Telegraphs.

A secretary who shall belong to the Post and Telegraph Administration. He shall have no voting powers.

5. The Commission shall examine the title to sites and technical conditions appertaining to all stations which shall constitute the French radiotelegraphic network; examine complaints regarding French stations; consider such administrative problems concerning the radiotelegraphic service as the Ministry of Public Works, Posts and Telegraphs deems fit to submit to it; institute experiments of general interest. The Commission shall be informed through the departments represented thereon of results obtained by various types of apparatus employed at stations in operation.

6. Exclusive of the periods of mobilisation stations established, kept up, and worked by Administrations other than that of Posts and Telegraphs may be open to public service in agreement with this Administration.

7. The Post and Telegraph Administration shall be responsible for all matters concerning the collection and taxes, foreign stations, and the International Bureau at Berne. It shall supervise the administration of international regulations in so far as they concern commercial traffic passing through coast stations in France, Algeria and Tunis, as well as

through stations on vessels of the mercantile marine.

8. Licences to establish private stations shall be granted by the Post and Telegraph administration upon the recommendation of the Commission referred to in Article 4. Such licences shall only be of a temporary character and the stations are strictly forbidden to interfere with the working of other stations.

9. Cost of experiments carried out on the demand of the Commission are regulated by special credit, negotiated through the budget of the Administration of Posts and Telegraphs.

10. The Ministers of Public Works, of Posts and Telegraphs, of War, of Marine, of Colonies and Foreign Affairs are charged in so far as concerns their respective departments, with the carrying out of this decree.

11. The provisions of the decree of February 7th, 1903, and of the decree of February 27th, 1904, are abrogated.

12. The provisions of Articles 2, 3, 5, 6, 7, and 8 are not applicable to the Colonies as far as local stations, as defined in Paragraph (c) of the 1st Article, are concerned.

The organisation of these stations, in the event of mobilisation, is regulated by Governors General and Governors in agreement with the Departments of War, of the Navy and of Colonies.

The personnel of the Administration of Posts and Telegraphs attached in any Colony to an Inter-Colonial Wireless Telegraph Station, not falling under one of the headings specified in Paragraph 5 of the 1st Article receives its working instructions from the Metropolitan Administration of Posts and Telegraphs.

These instructions are transmitted to it through the intermediary of the Administrative Authority of the Colony, except in case of urgency, and on condition that this authority is advised of them with as little delay as possible.

This personnel is placed, in regard to general discipline, under the surveillance and the authority of the high functionary who administers the territory in which is located the station. This high functionary gives to the supervised personnel annual notes, a record of which is kept in connection with their advancement.

Modifications other than those connected with the material of the stations, questions concerning the working and general organisation of the service are regulated in agreement with the Metropolitan Administration of Posts and Telegraphs and the Colony.

Colonial Military Stations are under the supreme authority of the respective Governors.

B Decree of February 24th, 1917, relating to the reception and transmission of radiotelegraphic signals.

ART. 1.—Private individuals and corporations are forbidden to establish or make use of telegraphic machinery, or apparatus, or any fittings whatsoever capable of transmitting or receiving signals, without the express authorisation of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs either on French territory or above that territory, or on board French vessels.

The employment on board foreign vessels in French territorial waters of wireless apparatus or installations, is forbidden, except in conformity with the rules laid down by the French Government for the employment of such apparatus and installations in the aforesaid territorial waters.

ART. 2.—Authorisation for the establishment of a transmitting radiotelegraphic station is only granted to private individuals, or corporations, under the proviso that no let or hindrance shall be able to arise therefrom to the detriment of the working of public stations. The Minister, whenever he shall think fit to authorise (after consultation with the Ministers of War and Marine) the establishment of any proposed station, shall lay down the conditions under which that station shall be erected and worked.

ART. 3.—Receiving wireless stations require the same authorisation, under the same conditions as transmitting stations.

It is understood, however, that stations destined for the reception of time and weather signals, whose erection is sought by French citizens, may receive due authorisation by the head of the local Postal and Telegraphic Service (when the latter is asked to do so by the parties interested) under the conditions laid down by a Decree of the Minister for Commerce, Industry, Agriculture, Labour, Posts and Telegraphs (after consultation with the Ministers of War and Marine). Special measures may be carried out under the authority of the Ministers of War and Marine in view of the concession in favour of stations of the kind above mentioned in certain stated districts.

ART. 4.—The royalties due from those who have been granted leave to erect stations are fixed by the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs and worked in consultation with the Minister of Finance.

Stations for the reception of time and weather signals shall be only liable to payment of a fixed royalty of five francs per year per station.

ART. 5.—In times of war—

(a) All private wireless stations, with the exception of those used by, or on behalf of, military authorities must be dismantled. The owners of such stations must remove the antennæ, and deposit the essential parts of their sending and receiving apparatus in places designated for that purpose by the Postal and Telegraphic authorities.

(b) The antennæ of wireless stations of mercantile vessels must be dismantled during the whole of the stay of such vessels in French ports and/or territorial waters, unless they have received special authorisation not to do so from the Naval Authority. Moreover, the Marconi Cabin must be locked up and the key placed in the hands of the master of the vessel. No work (either in the way of overhaul, repair, etc.) may be executed unless the aforementioned officer has assured himself that the work is being carried out by persons authorised to do so.

(c) It is within the option of the Minister of Commerce, Industry, Agriculture, Labour, Posts and Telegraphs (acting after consultation with the Minister of War and Marine), to prohibit for the time being all manufacture, vending or sale of radio-telegraphic apparatus, except under special licence.

ART. 6.—The rules laid down under Chapter V of the Decree-Law dated December 27th, 1851, are applicable to the conditions laid down by the present Decree.

In times of war any representative of the Minister of War, or the Minister of Marine shall be qualified equally with the Minister himself to institute the proceedings provided for in Art. 10 of the aforesaid Decree-Law.

Moreover, in times of war the War Office and Admiralty shall also have power to take the provisional measures laid down in Art. 12 of the Decree-Law of December 27th, 1851, if in their opinion such measures are matters of urgency.

Statements drawn up by officers of the French Forces, either on land or sea shall not require to be taken on oath. They are to be viewed as absolutely reliable unless the contrary shall have been proven.

C Decree of December 15th, 1917 (as modified by Decrees of May 15th, 1919, and March 21st, 1920).

ART. 1.—The Ministers of Commerce, of Industry, of Posts and Telegraphs have appointed an Extra Parliamentary Committee charged :—

(1) With the centralisation and examination of all general questions concerning the establishment of radiotelegraphic services and the exploitation of Inland, Inter-Colonial and International Wireless Telegraphy with the exception of the following :—

(a) The Military and Naval Organisation of the Inter-Allied Services established purely for Military or Naval purposes.

(b) Colonial services organised to ensure internal communications in any particular colony, or between two neighbouring colonies, two neighbouring groups of colonies, and a colony, or a group of colonies with neighbouring foreign countries.

(2) As a result of this examination to prepare on broad lines legislative, or administrative, regulations to be brought into force as soon as possible after the cessation of hostilities, the National Organisation of the Radiotelegraph Service which forms a part of the General Telegraph Service without infringing Art. 2 of the Decree of March 5th, 1907.

ART. 2.—This Commission will be composed as follows :—

Four members of the Senate.

Eight members of the Chamber of Deputies.

Seven representatives of the Ministry of Public Works, *i.e.* :

(a) Four representatives of the Administration of Posts, Telegraphs and Telephones.

(b) One representative of the Services of Harbours, of the Mercantile Marine and of Fisheries.

(c) One representative of the Service of Lighthouses and Buoys.

(d) One representative of the Services of Civil Aeronautics and Aerial Transport.

Three representatives of the Ministry of War.

Three representatives of the Ministry of Marine.

Three representatives of the Ministry of Colonies.

One representative of the President of the Council.

One representative of the Ministry of Foreign Affairs.

One representative of the Ministry of the Interior (service of public safety).

One representative of the Ministry of Public Instruction.

One representative of the Ministry of Finance.

Two representatives of the Radioelectrical Industry.

One representative of the Staff of the Wireless Service of the Mercantile Marine.

ART. 3.—The Commission formed under the present Decree will be presided over by the Under-Secretary of State for Posts and Tele-

graphs, assisted by two Vice-Presidents chosen from amongst the Members of Parliament.

ART. 4.—The Members of the Commission will be nominated by a Decree based on the report of the Minister of Posts and Telegraphs, of the Minister of War, of the Minister of Marine, and of the Colonial Minister, after the Head of each of the other Administrations mentioned in Art. 2 above shall have named their representatives to the Minister of Posts and Telegraphs.

ART. 5.—The active Members of the Commission who are bound to be present at a meeting may absent themselves on condition that their place is taken by a member of their same service who will represent them with votive powers.

ART. 6.—All previous regulations on this subject are hereby abrogated.

ART. 7.—The President of the Council, the Minister of War, and the other Ministers interested are charged, in so far as concerns their respective departments, with the carrying out of this decree, which will be published in the *Journal Officiel* and inserted in the *Bulletin des Lois*.

FORM OF SHIP'S LICENCE.

FRENCH REPUBLIC.

D MINISTRY OF COMMERCE AND INDUSTRY, POSTS AND TELEGRAPHS.

Office of Control, Telegraphic Administration.
Licence delivered in accordance with Article IX of the International Radiotelegraphic Convention Service Regulations.

In consideration of the undertaking given by the applicant and the particulars furnished by.....

And in consideration of the arrangements under the Convention and the Radiotelegraphic Regulations as codified in London on July 5th, 1913; and especially of Articles III, VII, VIII, X, XI, XIII, and XVI of the aforesaid Regulations.

And in consideration of the report supplied by the Engineer-in-Charge of the Radiotelegraphic Service following on his visit to the station on board.....

Authorisation is hereto given for the installation and maintenance of the radiotelegraphic station on board the..... which is scheduled under Class.....

The present licence is available for as long as the Radiotelegraphic Convention and Regulations of London remain in force.

Given in Paris on the..... day of.....

(Signed) on behalf of the Minister of Commerce, Industry, Posts and Telegraphs by.....

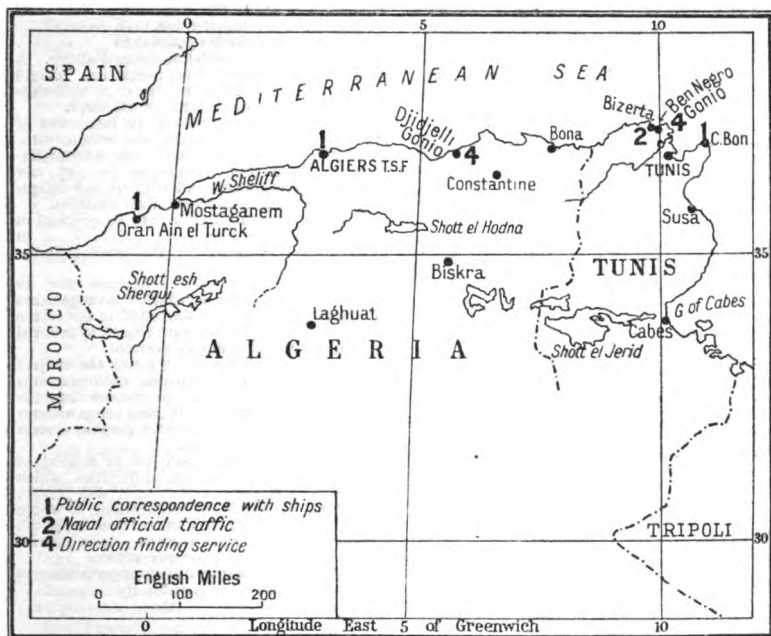
Chief of the Telegraphic Administration.

UNDERTAKING

GIVEN BY.....

Who in consideration of an authorisation to instal and maintain a wireless telegraph station on board the s.s. declares himself willing to submit, without reserve, to the clauses and conditions of the agreement whereof the text is herewith subjoined, with the object of obtaining such authorisation for utilising a wireless station on board the s.s.

ART. 1.—The installation of the proposed wireless station shall be submitted to the preliminary approval of the Administration of Posts and Telegraphs. Only apparatus manufactured in France, from materials sup-



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plied by builders or manufacturers having their workshops in France, can be employed in the construction of this radiotelegraphic station.

The average range of the station shall be

In the event of its being recognised—in consequence of improvements carried out in radiotelegraphy (affecting range, syntony, wave direction, etc.)—that important modifications can be adopted in the ship's station, the Administration of Posts and Telegraphs reserves to itself the right of providing for the adoption of such improvements.

Every subsequent alteration made to the station must be notified to the Administration of Posts and Telegraphs and receive official approval before its inception.

ART. 2.—..... shall take every care necessary to ensure that the installation, maintenance, and usage of the station, as well as any modifications introduced in accordance with the preceding article, shall be carried out without involving any expense to the Administration of Posts and Telegraphs.

ART. 3.—All contracts, agreements, etc., which have been entered into, or which shall in the future be entered into, between and the manufacturers of wireless apparatus, or which have been or shall be made with wireless companies, for the construction and maintenance of the station, shall—before being put into effect—be submitted for the approval of the Administration of Posts and Telegraphs.

ART. 4.—A charge in favour of the ship's station may be levied on the aforementioned vessel; its amount being fixed by the Administration of Posts and Telegraphs in agreement

with This charge shall not be made on official communications of the French Republic.

..... shall be liable to be called upon to place in an office of the Posts and Telegraphs a deposit, by way of guarantee for the charges received on board, and for which he is accountable to the Administration of Posts and Telegraphs.

In the event of the administration of the authorised station being granted to a company, shall remain responsible for the charges received on board.

ART. 5.—All telegraphists entrusted with the manipulation of apparatus must be of French nationality, and subject to the approval of the Administration of Posts and Telegraphs.

ART. 6.—The contents of telegrams transmitted by wireless, which reach the ship's station without being intended for shall not be divulged to any one whatsoever outside the officials appointed by the Administration of Posts and Telegraphs, or the competent officers of judicial police. No use whatsoever may be made thereof.

ART. 7.—The Administration of Posts and Telegraphs may, if it seems good to them, demand at any moment, and on immediate requisition, that the station on board shall be temporarily, or permanently, taken over by State officials. These officials shall be accommodated on board in the class corresponding to their grade. Their messing may be charged for, but not their transport. In such cases the Administration of Posts and Telegraphs shall render account to for the board ship charges due to him after making deduction of cost of upkeep of the station.

In the event of the Administration of Posts and Telegraphs deciding to apply the foregoing provision they may employ wireless telegraphic apparatus of a different type to that utilised by They reserve, moreover, the right, in case of need, of placing such apparatus on board in advance.

ART. 8.—The Administration of Posts and Telegraphs shall exercise in the manner which seems best to them their right of control over the authorised ship's station (installation, transmission, and reception of radiograms, rendering of accounts, etc.).

ART. 9.—The date of the initiation of the service of the ship's station shall be fixed by agreement with the Administration of Posts and Telegraphs.

After the establishment of the installation the apparatus cannot be removed without the express consent in writing of the Administration of Posts and Telegraphs. The apparatus must be continuously maintained ready for use, and must give fifteen days' notice in advance to the Administration of Posts and Telegraphs in the event of his desiring for any reason to cease to use the station.

In the event of the ship's sale, must advise the Administration of Posts and Telegraphs, informing them at the same time of the name and address of the new owner, as well of the arrangements which may have been made (should there be any such) for the closing of the station.

In any event, the aforesaid station cannot be closed down without the express consent in writing of the Administration of Posts and Telegraphs, and the holder of this licence shall

remain responsible for the charges due until authorisation for transfer has been received.

ART. 10.—The licence granted to applies only to the vessel mentioned above. A new licence would be necessary, should decide to instal a radiotelegraphic station on any other of his ships.

This licence can, moreover, be suspended or revoked at any time, and for any reason, without any liability on the part of the Administration of Posts and Telegraphs to pay any indemnity whatsoever, and without any obligation to state the reasons for their decision.

In particular, the licence may be revoked in the event of failure by to observe the provisions of the present agreement.

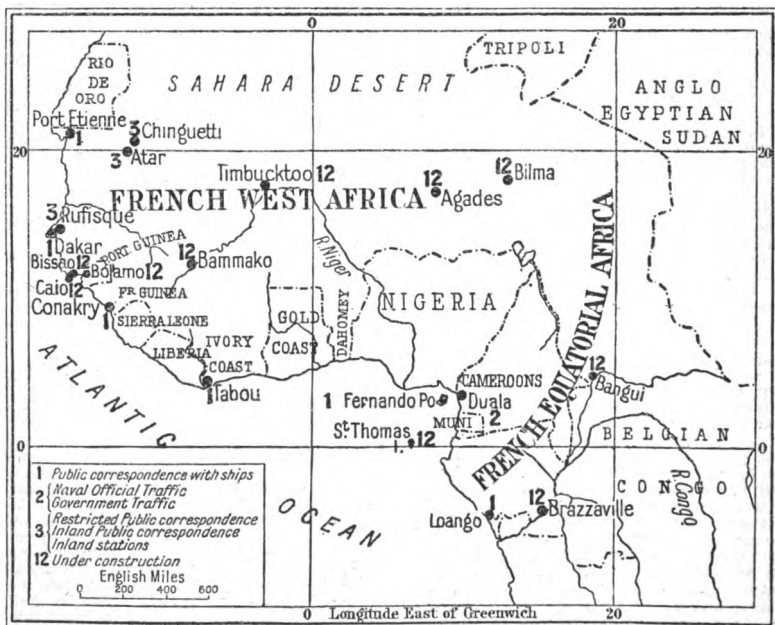
ART. 11.—..... declares that he subscribes to all the legislative arrangements and rules established, or that shall in the future be established, in France with regard to internal and international wireless service.

The wireless station which forms the subject of this licence shall exchange radiotelegrams with all the coast or ship stations within the sphere of action of which it shall come without any distinction of the radiotelegraphic system adopted by these stations.

ART. 12.—The State shall not be subject to any responsibility through difficulties which may arise between and private individuals, companies or corporations, to whom authorisation for carrying on wireless telegraph stations may have been granted; or in general with anyone soever or for any reason.

ART. 13.—The stamp duties appertaining to the present licence are payable by

Given on the day of



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LAW OF JULY 31ST, 1919.

E The President of the Council; the Minister of War; the Minister of Marine; the Minister of Public Works, of Transports and of the Mercantile Marine; the Minister of Commerce, of Industries, of Posts and Telegraphs; the Minister of Colonies, having seen the Decree of March 5th, 1907, Hereby decree:—

ART. 1.—Radiotelegraph Stations joining departments other than the departments of War and of Marine are in times of peace, in view of their utilisation in war time, under the control of a special commission instituted by the Minister of War (General Staff of the Army).

ART. 2.—The Commission is presided over by one of the sub-heads of the General Staff of the Army and comprises a representative of each of the following Ministries: Marine, War, Public Works, and Colonies, as well as of the Administration of Posts and Telegraphs.

These representatives, who are nominally elected by the Administrations which they serve, are in principle the Directors of the Wireless Service in their respective administrations.

Each has an assistant, also nominally elected, and with authority to take the place of the former in case of absence.

An officer of the General Staff of the Army carries out the functions of Secretary, with voting powers.

ART. 3.—The Commission will give its advice on all questions relative to the best means of utilising Radiotelegraph Stations, both fixed and portable in time of war.

It will especially occupy itself with the control of mobilisation of Non-Military Wireless Telegraph Stations, and to investigate experiments of every kind made to improve the utility of wireless in time of war of Non-Military Stations as suggested by the different Ministerial Departments.

ART. 4.—At least once a year, and more often if necessary, the Commission will overhaul Non-Military Stations and their technical equipment, and will also test the professional knowledge of the personnel. Each overhaul will be made by a representative of the Administration working the station and by a representative of the Ministry of War or of the Ministry of Marine according as to whether the station falls under the authority of the one or the other.

The Commission chooses those of its members who will undertake the overhaul, or will ask the departments interested to make the necessary selection from their personnel.

A *procès-verbal* will be prepared after each overhaul and forwarded to the Commission.

ART. 5.—The Commission will transmit its reports and the *procès-verbaux* of its sittings to the Ministers concerned through their representatives. The Ministers will take what steps are necessary in view of these communications.

ART. 6.—In the Colonies the overhaul on Non-Military Stations and of their technical equipment as also that of the professional knowledge of the personnel is carried out according to rules formulated under Articles 3 and 4, by representatives of the departments concerned who are chosen by the Governors-General or Governors.

Reports are transmitted by these High Functionaries to the Department of the Colonies. The latter formulates, if necessary, its observations or propositions.

UNDER SECRETARIATE OF STATE FOR POSTS, TELEGRAPHS AND TELEPHONES

F ADMINISTRATIVE ORDER OF FEBRUARY 27TH, 1920, REGULATING THE CONCESSION OF WIRELESS TELEGRAPH TIME AND METEOROLOGICAL STATIONS.

The Under-Secretary of State for Posts and Telegraphs, having seen the decree of February 24th, 1917, and in accordance with the advice of the Minister of War and of the Minister of Marine, on the proposal of the Director of the exploitation of Telegraphs,

Enacts:—

The conditions regulating the establishment and use, by private persons, of radiotelegraph stations intended solely for the reception of time signals and meteorological telegrams are fixed as follows:—

ART. 1.—Applications for authorisation must be addressed to the Director of Posts and Telegraphs of the department in which the station is to be installed.

Applicants must indicate the precise place where the station will operate and must furnish a description of the apparatus utilised. They must, if necessary, furnish evidence as to their French nationality.

ART. 2.—Authorisation is granted:—

(a) By the Director of Posts and Telegraphs concerned, when the applicant is of French nationality.

(b) By the Under-Secretary of Posts and Telegraphs to whom the application shall have been forwarded by the Director who will express his opinion, if the applicant be a foreign subject.

Authorisation is moreover subordinated to the opinion of the military authorities (General Commanding the Army Corps) to whose jurisdiction the place in question is subject when the station for which the concession is sought is situated at a point 50 kilometres or less distant from the land frontiers, and to the opinion of the Maritime Authorities (Maritime Prefect) to which the place is subject when the station is situated at a point 50 kilometres or less distant from the maritime frontiers.

ART. 3.—The receiving stations referred to in Article 1 cannot be used for purposes other than the reception of time signals and meteorological telegrams. Any transmission of signals is formally forbidden.

ART. 4.—The contents of radiotelegrams other than meteorological telegrams which might be received by the receiving stations authorised must not be published or divulged to any person whatever excepting to the officials designated by the Administration of Posts and Telegraphs or to the competent officers of the judiciary police. No use shall be made of such telegrams.

ART. 5.—The Administration of Posts and Telegraphs reserves the right to exercise over receiving stations authorised any control that it may deem fit.

ART. 6.—The State shall not be under any responsibility by reason of the utilisation of the wireless telegraph receiving stations for which a concession may have been granted.

ART. 7.—The concessionaries are bound to notify the Directors of Posts and Telegraphs of any change that they propose to make in the installation of their stations.

The Administration of Posts and Telegraphs may, moreover, at any time and for any cause whatever, suspend or revoke the authorisations

granted without being called upon to pay any indemnity or to reveal the reasons for its decision.

These authorisations do not carry any privilege and cannot impose any obstacle to the subsequent granting of authorisations of the same character to any other applicant. They cannot be transferred to third parties without the express and written authorisation of the Administration of Posts and Telegraphs.

At the first request of the Administration of Posts and Telegraphs every concessionary shall immediately put his station out of working order.

ART. 8.—The concessionary shall submit to all the regulatory of fiscal provisions resulting from the laws, decrees or regulations which might subsequently intervene as regards the establishment or use of wireless telegraph stations.

ART. 9.—The concessionary shall pay a statistical tax fixed at five francs per year and for each station authorised. This royalty is due for the whole year.

ART. 10.—The stamp dues applicable to documents relative to the authorisation of time stations shall be borne by the applicant.

Paris, February 27th, 1920.

(Signed) Gaston Deschamps.

LAW OF AUGUST 9TH, 1920.

CHAPTER I.

G STATIONS FOR THE SERVICE OF AERIAL NAVIGATION.

ART. 1.—The Service of Aerial Navigation installs and exploits all Radio-lectric Stations which are necessary to assure the carrying out of the Service and the security of aviators.

ART. 2.—The technical particulars of these stations (location, power, nature of transmission, wavelength, call letters) are arranged between the Under-Secretary of State for Posts and Telegraphs and the Under-Secretary of State for Aviation and Aerial Transport.

ART. 3.—If interference is caused by Stations of the Service of Aerial Navigation, or if these are interfered with by foreign stations the Under-Secretary of State for Posts and Telegraphs and the Under-Secretary of State for Aviation and Aerial Transport will agree on the technical means to be employed to avoid such interference.

ART. 4.—Certain stations of the Service of Aerial Navigation may be open to private correspondence by arrangement between the Under-Secretary of State for Posts and Telegraphs and the Under-Secretary of State for Aviation and Aerial Transport. In this case the tax payable for each telegram will be established in accordance with the rules in force for radiotelegraphic correspondence with ships at sea.

CHAPTER II.

LAND STATIONS INSTALLED BY PRIVATE COMPANIES.

ART. 5.—Land Radio-lectric Stations may be installed by Companies for Aerial Navigation, or by private persons with the object of communicating with aviators or to ensure their safety.

These stations and their personnel will be subject to the rules already issued, or to be issued in the future by the Administration of Posts and Telegraphs, for all private Radio-telegraph Stations.

ART. 6.—Requests for permission to instal stations and for licences for personnel must be sent to the Service of Aerial Navigation. If the

latter decides that they are justified by the necessities of aerial traffic, and that they will not compete with its own installations, such requests are forwarded to the Administration of Posts and Telegraphs together with their remarks. If the Administration grants such authorisation this will be made through the Service of Aerial Navigation, who, in turn, will advise the applicant.

ART. 7.—The Under-Secretary of State for Posts and Telegraphs delegates to the Under-Secretary of State for Aviation and Aerial Transport the control and working of stations defined in Article 5. It retains, however, its direct right of control in so far as complaints concerning the stations or the services committed by the latter are concerned. In this case a warning is given to the Under-Secretary of State for Aviation and Aerial Transport in order that a representative of this department may attend the enquiry and give his views. He makes a direct report to his department.

CHAPTER III.

AIRCRAFT STATIONS.

ART. 8.—Aircraft Radio-lectric Stations are of two categories those of the first category being utilised both for safety in navigation and for private communication; those of the second category being utilised solely for safety in navigation.

ART. 9.—The installation of all the stations defined in Article 8 and their control are under the same rules which regulate Wireless Stations of the Mercantile Marine.

ART. 10.—The personnel of stations of the first category are subject to the same rules as the Radiotelegraphic personnel of the Mercantile Marine.

ART. 11.—The personnel of stations of the second category must be in possession of a Special Licence granted by the Under-Secretary of State for Posts and Telegraphs.

ART. 12.—The Under-Secretary of State for Posts and Telegraphs delegates to the Under-Secretary of State for Aviation and Aerial Transport the right to authorise the installation of stations as defined in Article 8, also their control and working with the following exceptions:—

(a) Only apparatus of the type agreed upon by the Under-Secretary of State for Posts and Telegraphs may be authorised, and

(b) The Under-Secretary of State for Posts and Telegraphs exercises his direct right of control when he receives complaints concerning these stations, or of mistakes committed by them. In this case he warns the Under-Secretary of State for Aviation and Aerial Transport in order that a representative of the latter department may take part in the enquiry and give his views. He makes direct report to his department.

ART. 13.—In order to permit of the control during a flight of Radio-lectric Installations, the authority in charge of all aircraft must freely allow representatives of the Administration of Posts and Telegraphs and of the Service of Aerial Navigation to make inspection on board from time to time.

ART. 14.—Requests for authority to instal stations on board aircraft must be sent to the Service of Aerial Navigation. It should be stated whether stations of the first or second category are required.

CHAPTER IV.

ART. 15.—The stations mentioned in Articles 5 and 8 are subject to "Subscription" tax for management expenses which the Controlling Company is obliged to pay over to the Treasury. This Subscription Tax is fixed at 200 francs annually per kilowatt and per station, any fraction of a kilowatt being counted as one kilowatt and the minimum amount payable per station being fixed at 200 francs. It is payable to the State on January 1st for a complete year, and is due from the day when the station is put in commission; for the first year the amount is calculated proportionately to the time yet to run before December 31st.

ART. 16.—Any company which benefits under the arrangements of this regulation for a given time will only be taxed for a portion of the aircraft affected. The Under-Secretary of State for Aviation and Aerial Transport will determine the number of the latter; failing the total of aircraft affected the number of them which should come within the scope of this regulation.

ART. 17.—Every time that an aircraft is replaced by another the licence granted for the wireless station will be valid for the second machine and a fresh tax will not be payable.

ART. 18.—In all localities where no Radio-electric Station controlled by the Administration of Posts and Telegraphs exists for communication with aviators, the Service of Aerial Navigation and the Controllers of Stations named in Article 5 must receive and transmit gratuitously all Official Government Telegrams, on condition that they emanate from or are destined for aircraft.

ART. 19.—In case of interruption of their radio communication the Service of Aerial Navigation and the Controllers of the Station named in Article 5 are authorised to route their urgent service radio communications through the Administration of Posts and Telegraphs, which will give them priority in transmission.

Reciprocally the Service of Aerial Navigation and the Controllers of Stations named in Article 5 must, in the case of interruption of radio communications of the Administration of Posts and Telegraphs, transmit gratuitously through their stations during the hours at which they are open, official or private telegrams destined for aircraft which may be sent to them by the Telegraphic Offices of this Administration.

ART. 20.—Radio communications relative to the flight and safety of aircraft have priority over those set out in Articles 4, 18, and 19.

ART. 21.—The present law will be deposited with the Under-Secretary of State for Posts and Telegraphs (Central Service) and with the Under-Secretary of State for Aviation and Aerial Transport for notification to those whom it concerns.

DECREE OF AUGUST 26TH, 1920, FIXING THE TAX FOR RADIOGONIOMETRIC MESSAGES.

H ART. 1.—Each Radiogoniometric Message sent by a Land Station at the request of a Mobile Station (Aircraft) will be liable to a fixed Coast Tax of 6 francs.

ART. 2.—Mobile Wireless Stations belonging to the Departments of the Navy and of War (warships and war aircraft) are exempted from the Radiogoniometric tax.

ART. 3.—In accordance with Article 6 of the Law of November 29th, 1850, the State accepts no responsibility in connection with Radiogoniometric Messages.

ART. 4.—The date of the announcement of the application of the tax mentioned in Article 1 will be fixed by a Law of the Under-Secretary of State for Posts and Telegraphs.

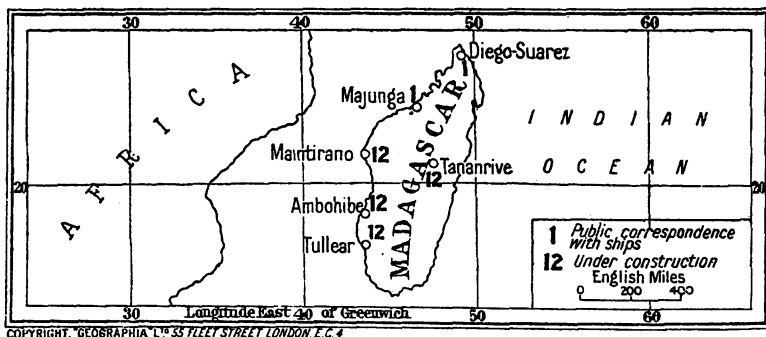
ART. 5.—The Minister of Public Works and the Minister of Finance are charged, in so far as they are respectively concerned, with the carrying out of the present Decree, which will be published in the *Journal Officiel* and inserted in the *Bulletin des Lois*.

Colonies of France

THE first trials of Wireless Telegraphy in French Colonial Possessions date from the closing years of the last century. From 1901 to 1907 the local services of the principal Colonies followed experiments in the new method of communication. The apparatus, of a type to-day obsolete, included direct excitation with induction coil and the registration of signals by means of the coherer.

These pieces of apparatus proved very satisfactory, despite the difficulties of establishing communication by wireless in tropical zones, caused through the intensity of electrical atmospheric disturbances in those regions. Trial stations were erected in 1902 and 1903 by Captain (now General) Ferrié, at Martinique and Guadeloupe, to replace the cable joining these two islands, which was broken by the eruption of Mont Pelé. Thus was the first commercial wireless service established in the French Colonies. Experiments made after 1907 demonstrated the necessity of replacing the old apparatus by the "Musical Spark."

From 1907 to 1912 the Governor administering West Africa developed the first coast system, embodying the stations of Dakar, Rufisque and Port-Etienne. Later this was completed by the construction of stations at Konakry (in Guinea) and Tabou (on the Ivory Coast). A station was also erected by the French Government at Monrovia, in the Republic of Liberia. At the same time it was decided to organise a large central station at Timbuctoo,



whose effective range should include the Mediterranean Coast. At Madagascar there were first constructed stations at Mayotte (Comoro Island) and Majunga, and later on at Diégo-Suarez, whilst in Indo-China were erected the stations at Cap-Saint-Jacques, at Kien-An, at Quang-Tcheou-Wan and at Hanoi. Such was the Colonial system about the end of 1912. The period of the world-war then intervened, effectually sealing all sources of information regarding wireless.

In 1917 the Government decided to commence the erection of a big Inter-Colonial system of wireless stations, viz., those at Saida (South Algeria), Bamako (French West Africa), Brazzaville (French Equatorial Africa), Tananarive (Madagascar), and Saigon (Indo-China). The original project made provision for the installation of two stations, which would ensure local communication and act eventually as a relay between France, the Far East, and Madagascar. These stations were intended for erection at Djibouti, on the Somali coast, and at Pondichery, in India. In view of the extent of their communication—9,000 kilometres from Paris to Tananarive, and 10,000 kilometres from Paris to Saigon—they were projected for regions where atmospheric conditions were least troublesome. Two other stations have been projected for Noumea and Papeete. They will act as relays to the French Oceanic Possessions, which are at present completely isolated and far from the nearest cable station.

The last station of the system, that at Martinique, will maintain communication with Tahiti (9,000 kilometres), West Africa (4,500 kilometres), France (7,000 kilometres), and will act as relay station between America and the Panama Canal.

Such constitutes, on broad lines, an outline of the development of the French Colonial wireless telegraph system.

The local systems of these Colonies are organised and regulated by their Governor-Generals and the other Administrators affected. Co-ordination in working is secured through the intermediary of the French Colonial Office (Secretarial and Counter-Signatory Departments), to which is attached a Special Committee, entitled the Colonial Committee of Radiotelegraphy, whose business it is to advise on all matters of general concern.

(For Positions of the Wireless Stations in French Indo-China, see map on page 402.)

FRIENDLY ISLANDS

(See PACIFIC ISLANDS—TONGA ISLANDS.)

GAMBIA

THE Colony of the Gambia was created in 1843, after a long history of trading competition in this locality with the Portuguese and French, dating from the time of Queen Elizabeth. Its separate constitution was inaugurated in 1888. The total area of the various islands and mainland adjacent thereto which go to make up the Colony is estimated at 4,000 square miles. The chief town is Bathurst, situated on the island of St. Mary, at the mouth of the River Gambia, in $13^{\circ} 24'$ N. latitude, and the only wireless station in the Colony is located there. Ruled as a Crown Colony, the administration is vested in a Governor assisted by two councils, one executive and one legislative, consisting of nominated and elected members.

ORGANISATION.

A proposal to establish wireless telegraph and telephone stations at Bathurst and MacCarthy Island is under consideration.

There are no privately owned wireless stations in the Colony, nor are there any wireless clubs or societies.

ADMINISTRATION.

The rules governing the working of wireless telegraphy in this Colony were originally instituted under the Ordinance (Maintenance of Control) of 12th February, 1903. This has now been repealed and the ruling Ordinance is that of the 22nd of September, 1913, entitled "An Ordinance to provide for the Regulations of Telegraphs." The text will be found below.

A—Ordinance, September 22nd, 1913.

B—Schedule.

C—Rules under 1913 Ordinance.

A I. This Ordinance may be cited as "The Telegraphs Ordinance, 1913."

II. The words "telegraphy" and "telegraph" mean any system used for conveying transmitting or distributing electricity or any like agent for the purpose of communication from one point to another.

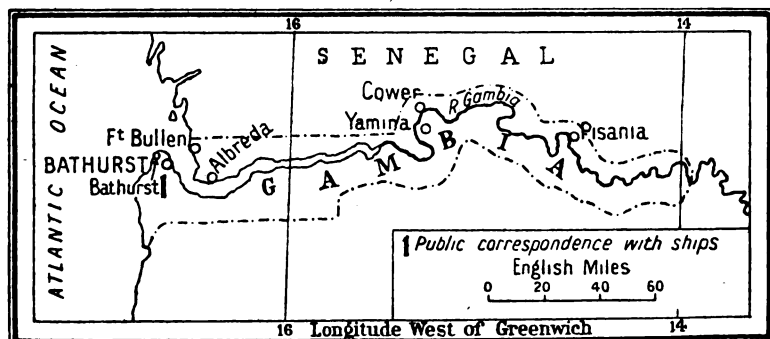
The expression "wireless telegraphy," means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

III. The Governor may, whenever he shall deem it expedient to do so, licence the establishment of any telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony or Protectorate, or on board any British ship registered in the Colony.

IV. (1) No person shall establish any telegraph station, or instal or work any apparatus for wireless telegraphy, in any place in the Colony or Protectorate or on board any British ship registered in the Colony except under, and in accordance with, a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period, as the Governor in Council may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

V. (1) If any person establishes a telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one hundred pounds or to imprisonment with or without hard labour for a term not exceeding



twelve months and in either case be liable to forfeit any apparatus for telegraphy installed or worked without a licence; but no proceedings shall be taken against any person under this section except with the sanction of the Legal Adviser to the Governor.

(2) If the Chief Magistrate, the Police Magistrate, or a Justice of the Peace is satisfied by information on oath that there is reasonable ground for believing that a telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, he may grant a search warrant to any Police Officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used, or intended to be used, for telegraphy therein.

VI. (1) The Governor in Council may amend, vary or revoke any of the regulations contained in the Schedule to this Ordinance, and may make regulations for all or any of the following matters:—

(i) prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(ii) prescribing the fees payable on the grant of any licence;

(iii) prohibiting or regulating the use of telegraphy in such telegraph stations, or of wireless telegraphy on board such ships while in such waters, by such further rules as the Governor-in-Council may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable, if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over telegraph stations or over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony.

(2) Provided that no regulations made in respect of the provisions in this section contained shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

VII. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

VIII. (1) Every omission or neglect to comply with, and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulation made thereunder, or in breach of the conditions and restrictions subject to, or upon, which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding fifty pounds or to imprisonment with or without hard labour for a term not exceeding six months.

(2) All convictions, forfeitures and fines under this Ordinance or any regulations made thereunder may be had and recovered before a Court of Petty Sessions.

IX. Nothing in this Ordinance contained shall invalidate or impair any agreement now in force entered into between the Governor of this Colony, or the Imperial Government on behalf of the Government of this Colony, and any telegraph company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance and use thereof, or to the payment of any subsidy to such company by the Government of this Colony or any other the like matter.

X. Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

XI. The Telegraphic Establishments (Maintenance of Control) Ordinance 1903 is hereby repealed.

To this Ordinance is attached a Schedule which runs:—

THE SCHEDULE.

B 1. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, or in the Protectorate, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, shall be worked or used whilst such ship is in any of the harbours of the Colony or Protectorate except with the special or general permission of the Governor.

3. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

It will be noted that under Section VI of this Ordinance the Governor-in-Council has power to make regulations. Of those which His Excellency has accordingly promulgated under date of the 28th January, 1914, the text runs as follows:—

RULES MADE BY THE GOVERNOR-IN-COUNCIL UNDER SECTION VI OF THE TELEGRAPHS ORDINANCE, 1913.

C 1. These rules may be cited for all purposes as "The Telegraph Rules, 1914."

2. The expression "the Company" shall mean any company, corporation or person for the time being engaged in the Colony or Protectorate of the Gambia in transmitting or receiving telegrams.

3. If and whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that the Government of the Colony and Protectorate of the Gambia shall have control over the transmission of telegrams by the Company, it shall be lawful for the Governor by warrant under his hand to direct and authorise such persons as he may think fit to assume the

control of the transmission of telegrams by the Company either wholly or partly and in such manner as he may direct, and such persons may enter upon the Company's premises accordingly or the Governor may direct the Company to submit to him or any person authorised by him all telegrams tendered for transmission or received by the Company or any class or classes of such telegrams, and to stop or delay the transmission of any telegrams or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of telegrams as the Governor may prescribe, and the Company shall obey and conform to all such directions.

Provided always that if default shall be made by the Company in the observance or performance of any provision hereinbefore contained it shall be lawful for the Governor by warrant under his hand to direct and cause so much of the Company's works as are in the Colony or Protectorate of the Gambia or any part of such works to be taken possession of for such services as to the Governor may seem fit, and in that event any person authorised by the Governor may enter upon the offices and works of the Company or any of them and take possession thereof and use the same as aforesaid. Nothing herein contained shall be deemed in any way to prejudice or abridge the power of the Government of the Colony and Protectorate of the Gambia to take possession under or by virtue of any agreement for the time being in force.

4. In any such case as aforesaid if the Company show that during the exercise of any of the powers aforesaid their receipts from the telegraphs with respect to which the said powers have been exercised have been less

than their receipts from the same source during a corresponding period on the average of the last three years preceding the Government of the Colony and Protectorate of the Gambia shall pay to the Company as compensation for any loss of profit sustained by the Company by reason of the exercise by the Governor of any of the powers hereby reserved such sum as may be settled between the Governor and the Company by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Governor are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and save with the consent of the Governor no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing indirect suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

5. In estimating such compensation as in the preceding section provided the Arbitrator shall take into account all the circumstances of the case, including not only any such loss as aforesaid but also any additional profit accruing to the Company from the emergency which gave rise to the exercise of the powers aforesaid, and as regards the telegraphs with respect to which the said powers have been exercised the receipts of the Company on the average of the last preceding three years during a period corresponding to that of the exercise of the said powers shall be deemed to be the receipts which the Company would have taken during the period of the exercise of the said powers had the powers not been exercised.

GEORGIA

(See map on page 389.)

THIS small Republic has only recently gained its independence, and lies in the mountainous region of the Caucasus. Its chief town is Tiflis, whilst it possesses in Batum its outlet to the world through the Black Sea.

CONTROL.

Wireless Telegraphy constitutes a State monopoly, and is under the control of the War Office.

ORGANISATION.

The first wireless station on Georgian territory was erected during the war in 1914 for the use of the Caucasian Army which was fighting on the Turkish front. The following stations are those now existing: Tiflis, Batum and Poti.

Great improvement was made in the wireless services in 1918, when Germany recognised the independence of Georgia and a small Expeditionary German Corps was sent to the Republic. The Germans maintained a wireless service between Tiflis and Berlin by means of several ships on the Black Sea through Batum and Constanza (Roumania).

At the present time there is a very powerful station at Tiflis which was improved by the Italians. The Director of this station is Prince A. Andronikashvili and there are six other officials.

No other classes of wireless stations exist but these Government stations are used for commercial purposes and also for communicating with aircraft.

The employees of the wireless station have to pass a special examination, and a certificate is issued to them to that effect. No amateurs are admitted to it.

The Tiflis Wireless Station receives and despatches messages to and from Moscow, Basra and Constantinople, thereby acting as a relay station between these points. There is also one British Light Cruiser, one Italian Destroyer, and one American Destroyer at Batum, which have wireless installation and work in conjunction with the Georgian Central Station in Tiflis.

ADMINISTRATION.

No special laws exist yet, although they are now being worked up.

GERMANY

THE German "Empire" dates only from April 16th, 1871, when the kingdoms of Prussia, Bavaria, Saxony and Wurtemberg, together with six Grand Duchies, five Duchies, seven Principalities, and the "Free Towns" of Lubeck, Bremen, and Hamburg, elected the King of Prussia as *Deutscher Kaiser*.

CONTROL.

The Imperial Ministry of Posts is the central authority for the whole of the wireless system of the German Republic. To deal with all matters having reference to wireless telegraphy, a special section—Section V—was formed in the Imperial Ministry of Posts, which regulates all basic questions regarding installation, administration of traffic and working.

Under the authority of Section V is placed the Wireless Working Department (*Funk-Betriebsamt*), whose sphere of activity lies principally with work relating to the technical side of wireless telegraphy as well as the building and working of wireless installations.

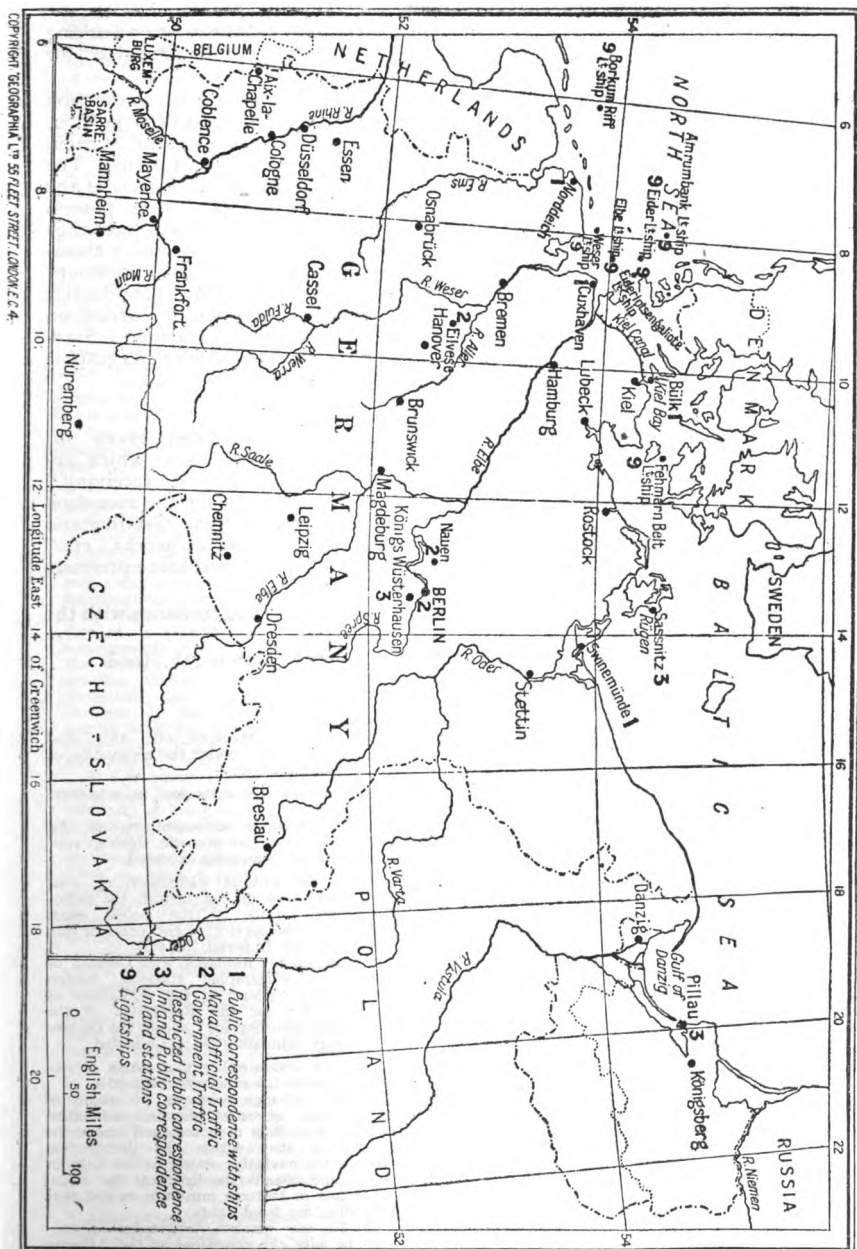
OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. Giesberts	Minister of Posts	Berlin.
Dr. Engineer h.c. Hans Bredow ..	Controller of Wireless Telegraphy	Berlin.

ORGANISATION.

Wireless telegraphy, after having demonstrated its serviceability as the result of trials, was brought into the service of general public communication as early as the year 1900, by the utilisation of the coast wireless station on the Island of Borkum. Since then the practical use of wireless telegraphy, which has kept pace with technical development, has been advanced to such a degree that on the outbreak of the world war there were in Germany and in countries under German protection 26 coast stations and over 600 ship stations, in addition to numerous testing stations. There further existed the high-power wireless stations of Nauen and Eilvese for traffic with America and with the high-power stations of Kamina (Togoland) and Windhuk (South-West Africa), as well as the wireless stations at Tsingtau, Yap, Nauru, Rabaul, and Apia.

In Germany there are at present 13 coast stations, of which four are intended for general, and nine for restricted public service with ships at sea. Further, there are three direction-finding stations, which, however, have not yet been opened generally for public service. The three high-power stations of Nauen, Eilvese, and Königs Wusterhausen are only used for traffic with fixed land stations; but this traffic has not yet been regulated internationally. Nauen and Eilvese are used for overseas traffic and Königs Wusterhausen for European traffic. At the present time Eilvese is working with Spain.



The inter-continental service is developing generally in accordance with the provisions of the International Telegraph Convention and the relative working agreement. Telegraph money orders are, however, not admitted for transmission by wireless telegraphy.

The *State Wireless System (Network)* which is in course of completion is intended for the completion and relief of the wireless telegraph system. It will consist of a wireless collecting station in Berlin as a central station, as well as of chief district wireless stations and ordinary stations. The chief district stations will constitute the central traffic point of each of the wireless districts into which the State territory is divided. They possess sending and receiving installations of such a strength that a direct exchange of wireless correspondence is possible between all chief district offices themselves and with the wireless collecting station in Berlin. The ordinary wireless stations erected within each district work with their chief district station as well as between themselves. The traffic is generally carried on in accordance with the wireless telegraph regulations. Nevertheless, State telegrams are not usually forwarded by wireless routes, likewise telegraphic money orders are excluded from transmission by wireless routes.

ADMINISTRATION.

For some time past authorisations have also been given for the erection and working of private wireless installations in which are distinguished "Experimental installations for sending and receiving," "Experimental installations for receiving," "Installations for the reception of the Nauen time signal" and Wireless Working installations (Sending and Receiving installations) for overland power stations, water works, etc." The conditions in which they are approved will be determined more precisely in accordance with the special circumstances of each case.

The present Wireless Laws and Regulations appear in accordance with the following list:—

A—Telegraph Law of the German Empire, March 7th, 1908.

B—Regulations (Foreign Ships).

C—Conditions of Concession (Ship Stations).

A *Sole Article.*—The Act of April 6th, 1892, relating to telegraphs in the German Empire is modified as follows:—

1. Article 3 is completed by the following paragraph (2):—

Installations of electric telegraphs for transmission of messages without the aid of metallic wires of junction shall not be established and worked, except with the authorisation of the State.

2. The following provisions are inserted after Article 3:—

(3a) Telegraphic installations which are not exclusively designed for the internal service of a ship cannot be established and worked on German vessels unless authorised by the State.

(3b) The Imperial Chancellor shall decree the regulations concerning the working of telegraph stations on board foreign vessels in German territorial waters.

3. Article 7 is completed by the following paragraph (2):—

The provision of Paragraph 1, Phrase 1, does not apply till July 1st, 1913, to installations of the nature defined in Article 3, Paragraph 2.

B The following regulations are decreed for the working of telegraphic installations on board foreign ships in German territorial waters, and are founded on Article 3 (b) of the "Telegraph Law of the

German Empire," of April 6th 1892, and March 7th, 1908, and under the reservation of Article 15 of this law:—

1. Ships of war are authorised, in a general manner—

(a) To exchange messages, signals, by means of optic and acoustic signals, submarine acoustic signalling excepted.

(b) To use wireless telegraphy, on condition that they do not disturb the radiotelegraphic service of the public coast stations, or the service of the coast or ship stations of the Imperial Navy.

In exchanging messages with German or foreign radiotelegraphic stations, foreign vessels must conform to the regulations of the "Decree for the Regulation of the Radiotelegraphic Service" and to the Decrees which may ultimately be promulgated.

2. Foreign vessels other than ships of war are authorised—till otherwise decreed—

(a) To exchange messages by means of optic and acoustic signals, submarine acoustic signalling excepted, and under the reservation that within the illumination zone of the navigable waters of the German coasts and islands the lights of the signal protectors or lanterns must not exceed that prescribed for fixed lights.

(b) To use wireless telegraphy in conformity with the provisions of the "Decree Regulating the Radiotelegraphic Service" and the decrees which may ultimately be

promulgated; nevertheless, in the ports, roadsteads, and estuaries, and in the navigable waterways of the interior, wireless telegraphy can only be used on an authorisation being granted in writing by the Ministry of Posts and Telegraphs of the German Empire.

3. In the public interest the Articles 1 and 2 may be temporarily restricted or suspended.

4. Whosoever works telegraphic installations in a way not authorised by the preceding provisions is liable to fines determined in Article 9 of the "Law of Telegraphs," and in virtue of Article 40 of the Penal Code of the German Empire all the apparatus designed for the transmission of wireless messages can be confiscated. Moreover, installations which have been worked without a licence can be, in conformity with Article 11 of the "Telegraph Law," removed or rendered unserviceable.

C The following are some of the principal conditions on which the concession for the installation and working of a radiotelegraph station on board ship is granted—

1. The concession for the installation and working of the ship station may be withdrawn at any time.

2. The station must fulfil the following requirements:—

(a) The construction of the station must be in accordance with modern developments of science and technology.

(b) The ship station must be equipped in such a way as to be able to use the two wavelengths of 600 and 300 metres.

(c) The waves must be as pure and little damped as possible. The use of sending arrangements with which the production of the emitted waves takes place by direct sparking discharges of the antenna is not permitted, except in cases of distress. However, it may be allowed for certain special stations—e.g., for such on small ships—the primary energy of which does not exceed 30 watts.

(d) The power transmitted by the radiotelegraphic apparatus, measured at the terminals of the generator, must not under normal conditions exceed one kilowatt.

(e) With the reservation of the special provisions concerning the application of the 1,800 m. wave, a power of more than one kilowatt may be used if the ship must maintain communication over a distance exceeding 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be maintained except by means of an increase of power.

(f) The apparatus must be suitable for transmitting and receiving at a speed of at least 20 words per minute, five letters being counted as one word. Installations working with more than 30 watts must be equipped so as to be able to cover several distances within the normal range of transmission, the shortest of which shall be about 15 nautical miles.

(g) The receiving apparatus must be capable of reception up to 600 miles with the greatest possible protection against disturbances.

3. Ships belonging to the first two categories stated under Article 8, in addition to the ordinary apparatus, must be equipped with emergency gear having an independent source

of power and capable of working for at least six hours, with a minimum range of 80 nautical miles in the case of ships in the first category, and of 50 nautical miles of those of the second category. The emergency gear is not necessary in the case of ships whose ordinary plant fulfils the conditions for emergency sets.

The emergency gear, as well as the ship stations themselves, must be placed as high as possible above the deck—viz., according to the structure of the ship and the available space, either equal to the height of the bridge or of the large boat deck, so that in case of accident they shall be able to remain longest above the water. When using batteries for the emergency plants accumulators may be arranged in the station room itself, whilst acid accumulators, on account of the vapours which they develop, must be placed outside the station room, but in its immediate vicinity and so that they are protected against outside influences.

4. The contractor must submit to the Imperial Telegraph Administration a description of the ship station, together with a plan of the circuits. Subsequent alterations of the technical equipment affecting transmission or reception must not be made without the consent of the Imperial Telegraph Administration.

5. In order to examine the prescribed arrangement of the ship's station, and the carrying out of the service, the officers of the Imperial Telegraph Administration are permitted at any time to enter the rooms where the apparatus is installed, and to inspect the working equipments.

6. The radiotelegraph service on the ship must be operated only by German subjects.

7. The service of the ship station must be carried out by an operator holding a certificate issued by the Imperial Telegraph Administration, or in an emergency, and for one journey only, by another Government which is a party to the International Radiotelegraphic Convention.

There are two classes of certificates.

The first-class certificate for the capability of the operator, with regard to:—

(a) The adjustment of the apparatus and knowledge of the methods of working.

(b) Transmitting of telegrams and receiving by sound at a speed of at least 20 words per minute.

(c) Knowledge of the regulations applying to the exchange of radiotelegraphic communication.

The second-class certificate may be issued to an operator who attains in transmitting and receiving a speed of 12 to 19 words per minute, but who fulfils the other conditions mentioned above. Operators holding a second-class certificate may be admitted:—

(a) On ships which use radiotelegraphy for their own service only and for the exchange of messages of the crew, in particular on fishing vessels.

(b) On all ships as junior operators, provided that such ships have on board at least one operator holding the first-class certificate. Nevertheless on ships placed in the first category mentioned in Article 8 the service must be carried on by at least two operators holding the first-class certificate.

Transmission may be made only by an operator holding either the first or second class certificate, except in cases of emergency.

8. Ship stations are placed in three categories:

- (1) Stations always open.
- (2) Stations having limited working hours.
- (3) Stations having no fixed working hours.

During navigation the following must remain permanently on the watch:—

- (1) The stations of the first category.
- (2) Those of the second category during the hours that they are open for service; out of these hours these stations must remain on the watch for the first ten minutes of each hour.

The stations of the third category are not bound to perform any regular "listening" service.

9. The ship station operator is under the supreme authority of the captain or of the captain's representative, who, in his capacity as superintendent of the ship station, is entitled to note the contents of all telegrams provided he has been placed by the Imperial Telegraph Administration, or, in the case of ships that are permanently abroad, by a German Consulate (General or Vice-consulate), under the obligation of preserving the secrecy of correspondence.

10. The certificate may be withdrawn if, in the case of any offences against the "Regulations for the Radiotelegraph Service," the operator has been found guilty after an inquiry.

11. If it is shown that the offence is due to the condition of the apparatus or to instructions given to the operator, the same pro-

cedure will be followed in respect of the licence issued to the ship.

12. The certificate may also be withdrawn if it is stated by an officer of the Imperial Telegraph Administration that the operator is no more in possession of the prescribed knowledge and skill. In the latter case a certificate will be granted to the operator after he has successfully passed a further examination.

13. Every change in the staff of the ship station must be reported immediately to the local post office of the home port.

14. The ship station is bound to interchange radiotelegrams with every coast station and with every other ship station, without regard to the particular system of radiotelegraphy employed.

15. The Radiotelegraph Service is regulated in accordance with the rules in the "Instructions for the Radiotelegraph Service." In addition, special instructions which may be issued by the Imperial Telegraph Administration must be observed also.

22. The ship station must be in possession of the certificate from the Imperial Telegraph Administration, stating that the installation and the working of the station have been licensed by the authority named and the category in which the station is placed. This certificate must be kept in the station and presented upon the request of the authorities of the countries at the ports at which the ship calls.

GIBRALTAR

(See map on page 414.)

PERHAPS nowhere in the world has more romance been crowded into a tiny piece of territory than is the case with the rocky promontory, $2\frac{1}{2}$ miles long by $\frac{1}{4}$ mile broad, which we know as Gibraltar. Its name (*Gebel-Tarik*, the Rock of Tarik, a famous Mohammedan Conqueror) is simply crystallised history. British since 1713, its famous $3\frac{1}{2}$ years' siege ended in 1783.

CONTROL.

In this essentially naval and military station, the Commander-in-Chief acts as Governor, exercising autocratically both administrative and legislative functions.

ORGANISATION.

There are no commercial wireless telegraph stations in Gibraltar, and the right to use wireless telegraphy is reserved to the Government. Private wireless of any description, whether amateur, commercial, or experimental, is strictly forbidden; not only the control, but the possession and working of radiotelegraphy, being exclusively vested in military or naval hands. At the present time there are three stations in existence, one for public service to ships and two used for Government traffic only.

ADMINISTRATION.

The Ordinance to prohibit importation, keeping, use or establishment of any apparatus or installation for transmission of messages by wireless telegraphy by unauthorised persons in Gibraltar came into force on October 20th, 1903. This Ordinance has been amended by the Wireless

Telegraph Apparatus Amendment Ordinance, 1909 (February 3rd), and in the text below the amending words are shown in brackets :—

We print below the ruling Ordinances and regulations :—

A—Wireless Telegraph Apparatus Ordinance, 1903.

B—Wireless Telegraph Apparatus Further Amendment Ordinance, 1909.

C—Rules as to use on Merchant Ships.

D—Ship Licence.

A 1. This Ordinance may be cited as "The Wireless Telegraph Apparatus Ordinance, Gibraltar, 1903."

2. No person shall import, keep, use or establish in Gibraltar [or on board any British ship registered in Gibraltar] any apparatus or installation for the receipt or transmission of messages by wireless telegraphy without the licence in writing of the Governor, and under such terms and conditions as may be prescribed in such licence, which licence the Governor may in his discretion at any time cancel and revoke.

3. It shall be lawful for the Governor by order in writing to authorise the Chief of Police or any other person named by him in such order to enter at any time by day or night and by force, if necessary, any premises or place [or any ship] in Gibraltar, and to search for any such apparatus or installation as described in this Ordinance, and to seize and remove the same to be dealt with in such manner as the Governor may direct.

4. Any person offending against this Ordinance, or resisting or in any way interfering with any person charged with the execution of an order issued by the Governor under the preceding section, may be arrested without warrant and shall be liable on conviction by a Court of Summary Jurisdiction to a penalty not exceeding £50, or to imprisonment with or without hard labour for any term not exceeding three months.

5. All penalties under this Ordinance shall be recoverable summarily in manner directed by "The Justices Ordinance, Gibraltar, 1890."

B The "Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909" (April 30th), contains the following clause :—

2. A person shall not work any apparatus for wireless telegraphy installed on merchant ships, whether British or foreign, while in Gibraltar otherwise than in accordance with rules made in that behalf by the Governor, and the Governor may, by any such rules, impose penalties recoverable summarily for the breach of any such rules, not exceeding £10 for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ships. All such rules shall be published in the Official Gazette and after such publication shall have the same force and effect as if enacted in this Ordinance.

C The following rules as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in Gibraltar, were made on May 3rd, 1909, under "The Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909" :—

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters

of Gibraltar shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in Gibraltar or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of Gibraltar, except with the special or general permission in writing of the Governor.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Any person offending against any of these rules shall be liable to a penalty not exceeding ten pounds for each offence recoverable summarily under "The Justices Ordinance, Gibraltar, 1890," and any apparatus for wireless telegraphy installed or worked on such ship may be forfeited to His Majesty.

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.

D To all to whom these Presents shall come.

I,, Governor of the City and Garrison of Gibraltar send greeting :

Whereas Messrs..... of (hereinafter called the licensee) is desirous of establishing, installing, working and using, in a ship belonging to the licensee to wit the wireless telegraphy :

And Whereas by reason of the provisions of the Summary Conviction Ordinance, 1885, it is unlawful to establish, keep or use in Gibraltar or on board any British ship registered in Gibraltar any apparatus or installation for the receipt or transmission of messages by wireless telegraphy without the licence in writing of the Governor and under such terms and conditions as may be prescribed in such licence.

And Whereas at the request of the licensee I have agreed to grant to the licensee the licences, powers and authorities hereinafter expressed and contained for the period and upon

the terms and subject to the stipulations and conditions hereinafter appearing :-

Now, I, the above-named..... Governor of the City and Garrison of Gibraltar, in exercise of all powers and authorities enabling me in this behalf, do hereby grant to the licensee, during the term or period commencing on the day of the date hereof and until these presents and the licence or permission hereby given shall be determined or revoked, licence and permission,

(i) to establish, instal and work for the purposes hereinafter mentioned on board the steamship apparatus for wireless telegraphy (which apparatus is hereinafter referred to as "the licensed apparatus");

(ii) to send and receive messages by means of the licensed apparatus between the said steamship and coast stations and other ship stations.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions :-

1. The provisions of the Imperial Telegraph Acts, 1863 to 1916, and the Regulations made

thereunder shall be deemed to apply to this licence and on any breach thereof this licence shall be null and void.

2. The licensee shall observe the provisions of the Radiotelegraph Convention, 1912, the Service Regulations made thereunder and any modification of the Convention or Regulations made from time to time.

3. The licensee shall, except as set out hereinafter, use the licensed apparatus solely on behalf and in the course of the business of the licensee and the licensee shall not receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus.

4. The licensee shall so far as possible receive from ships and lights stations all requests for assistance and all signals of distress and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

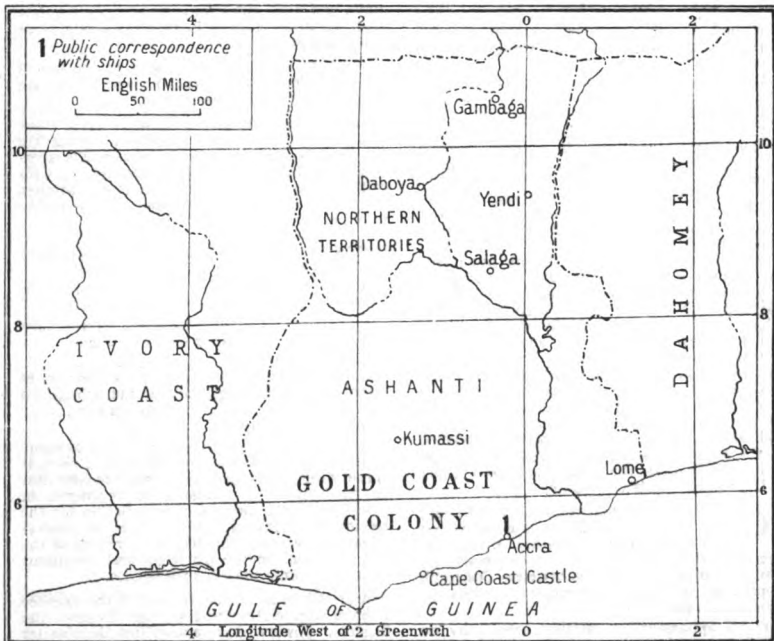
Given under my hand and seal at Gibraltar this.....day of.....19..

GILBERT AND ELLIS ISLANDS

(See PACIFIC ISLANDS.)

GOLD COAST COLONY

THE Gold Coast Colony comprises the coast of the Gulf of Guinea from about longitude $3^{\circ} 7'$ W. to $1^{\circ} 14'$ E. of Greenwich; with a protectorate extending inland to an average distance of 440 miles or to the 11° of N. latitude. It is bounded on the west and north by the French Colonies of the Ivory Coast and French Sudan, and on the east by the ex-German colony of



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Togoland. The natives are almost Pagans, but Mohammedanism and Christianity are steadily gaining ground. English merchants started trading at Kormantyne on this coast in 1618, and Chartered Companies subsequently took up the task of organising British trade. Their settlements were in 1821 transferred to the Crown, and a separate establishment under the title of Gold Coast Colony was created in 1874. The seat of Government is at Accra, and the administration is conducted by a Governor, aided by a nominated Executive Council and by a Legislative Council of six official and four unofficial members.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. S. B. Gosling	Postmaster-General	Accra.
Major J. F. O'Shaughnessy	Engineer-in-Chief of Posts and Telegraphs Dept.	Do.
Mr. L. C. C. Miles	Operator	Do.
Mr. P. McC. Connolly	Do.	Do.

ORGANISATION.

Radiotelegraphy was introduced in 1912, and in 1913 the Accra station was completed.

There are no privately owned experimental or amateur stations; neither are there any wireless clubs or societies. In fact no licences have been issued to any classes of individual or corporations, radiotelegraphy in this Colony being still in its infancy.

ADMINISTRATION.

The first Act to regulate radiotelegraphy in this Colony was "The Wireless Telegraphy Ordinance, 1903." This was followed by "The Wireless Telegraphy (Amendment) Ordinance, 1913" (see the WIRELESS YEAR-BOOK for 1915). These Ordinances, however, were both of them repealed by "The Wireless Telegraphy Ordinance No. 15 of 1913," which is the extant Government Ordinance as at present administered, and the text thereof will be found below.

Annexed to this Ordinance are regulations applying to Merchant Ships, whereof the text appears below. In 1917 the Government promulgated Rules for the Regulation of Wireless Telegraphy within its territorial waters. These rules also figure in the following pages:—

The Laws and Regulations here printed are:—

A—Wireless Telegraphy Ordinance No. 15
of 1913 (dated October 4th, 1913).

B—Regulations (Merchant Ships).

C—Rule No. 17 of 1917.

A An Ordinance (No. 15) to provide for the regulation of Wireless Telegraphy, 4th October, 1913.

Be it enacted by the Governor of the Gold Coast Colony, with the advice and consent of the Legislative Council thereof, as follows:—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraphy without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place

or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the Colonial waters otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as

they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the Colonial waters shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate or District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any Commissioner or Assistant Commissioner of Police or any person appointed in that behalf by the Commissioner of Police and named in the warrant, and a warrant so granted shall authorise the Commissioner or Assistant Commissioner of Police or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before a District Commissioner's Court on the complaint of a Commissioner or Assistant Commissioner of Police or of any person thereto authorised by the Commissioner of Police in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphy Ordinance, 1903, and the Wireless Telegraphy (Amendment) Ordinance, 1913, are hereby repealed.

REGULATIONS.

B (i) All apparatus for wireless telegraphy on board a merchant ship in the Colonial waters shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the Colonial waters and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(ii) In these regulations "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

(iii) No apparatus for wireless telegraphy on

board a merchant ship shall be worked or used while such ship is in any harbour, port or bay of the Colony except with the special or general permission of the Governor.

(iv) For the purpose of any proceedings under these regulations the master or person being, or appearing to be, in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(v) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be, in command or charge of the ship.

(vi) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

RULE No. 17 of 1917.

C Under and by virtue of section 8 of the Defence of the Colony Ordinance, 1914, I, Sir Hugh Charles Clifford, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Gold Coast Colony, with the advice of the Executive Council of the said Colony, do hereby make the following rules which I, with the advice aforesaid, consider necessary for the public safety and the Defence of the Colony.

1. The radiotelegraphic stations on board ships (other than His Majesty's ships of war) shall not be worked, except for the reception of messages whilst such ships are within any harbour, port or within any roadstead within the Colonial waters of the Colony.

2. For the proper enforcement of the last preceding rule.

(a) The master of every ship of British or Allied register whilst in any such harbour, port or roadstead shall cause the sending and transmitting portion of the radio apparatus on such to be disconnected and to be kept disconnected from the dynamo, accumulators, or other source of electrical power available, so that radio messages cannot be sent from the ship.

(b) If an officer appointed in writing by the Postmaster-General to examine the wireless apparatus on any ship shall so order, the master of such ship within such harbour, port or roadstead shall cause all portions of the radio apparatus on such ship to be disconnected or sealed in such manner as such officer shall order, and shall cause the same to be kept so disconnected or sealed while such ship is within such harbour, port or roadstead.

(c) The master of a ship of neutral register shall immediately on arrival in any such harbour, port or roadstead cause the aerial wires to be taken down completely and disconnected from the radiotelegraph apparatus on such ship and shall cause such wires to remain so down and disconnected while such ship is in such harbour, port or roadstead, and shall cause the operating room to be sealed and kept sealed and such other steps to be taken as any officer appointed by the Postmaster-General for the purpose may order.

Made at a meeting of the Executive Council held at Government House, Accra, this 1st day of September, 1917.

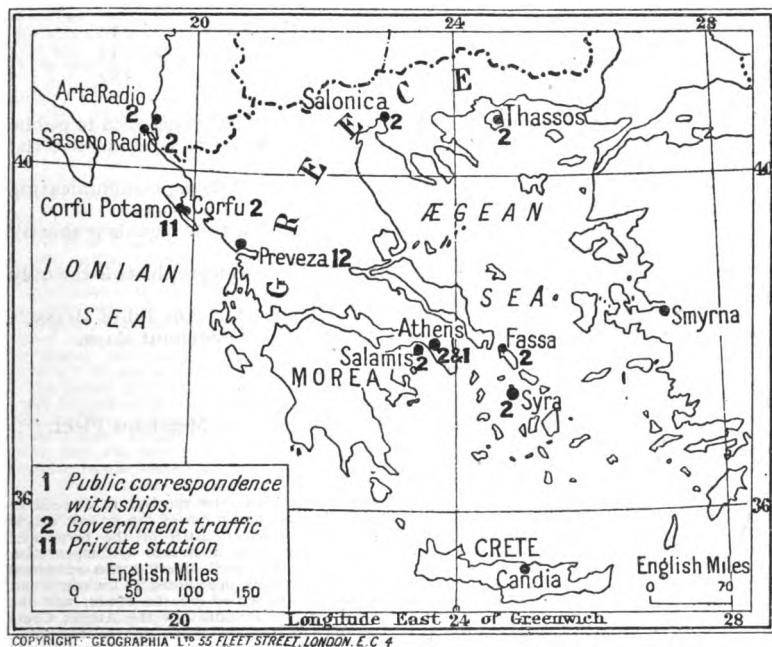
(Signed) HUGH CLIFFORD,
Governor.

GREAT BRITAIN

(See UNITED KINGDOM.)

GREECE

ONE of the oldest maritime countries in the world, the kingdom of Greece lies in latitude $34^{\circ} 45' 43''$ N., its longitude stretching between $19^{\circ} 20' 28''$ 30 E.



The State consists (a) of the southern part of the Balkan Peninsula, including all Thrace (except a small area round Constantinople), (b) of western Asia Minor, and (c) of islands in the Aegean, Mediterranean and Ionian Seas.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
A. Miaoulis	Minister of the Navy	Asklipiou Str. 45, Athens.
Capt. C. Athanasiadis ..	Head of the Radiotelegraphic Service	Nikis Str. 45, Athens.
Com. L. Teocharis	First Assistant to Head of Radio Service.	Panepistimiou Str. 53, Athens.

ORGANISATION.

The Greek Ministry of the Navy, following the lead of other countries, took up the question of wireless seriously in 1909, when Capt. Athanasiadis, the present head of the Radio Service (an officer of the Navy), was sent to England at the head of a Mission for the construction of different stations.

The first wireless land station was erected at Athens, and completed in February, 1911, and several other stations were installed on ships of the Navy. It was only during the Balkan War (1912-1913) that other land stations were erected, the Athens station being the only land station in Greece up to that moment.

A new scheme of coast wireless stations has been laid down since the recent increase of territory, and is to be completed within four years. This scheme includes more than twenty stations.

The following is a summary of the wireless stations under the control of the Greek Authorities :—

Land stations under the Ministry of the Navy ..	10
Proposed stations	11
Ship stations for Public Service	150
Stations on warships	30

For the present the Athens station, No. 2, is the only one open to public service. During the present year other coast stations are to be opened to the public service.

A powerful station has just been completed near Athens, communicating direct with all other European countries.

The transmission of meteorological, aviation and time signals is shortly to be placed on new bases.

Wireless Societies or Clubs.—The Union of Greek Telegraphists is the only organisation of persons interested in wireless.

The Société Anonyme Internationale de Télégraphie sans Fil of Brussels is the only company erecting and working stations on merchant ships.

ADMINISTRATION.

A—Law, 1831, passed January 14th, 1920.

B—Regulation on the Wireless Service of the Merchant Fleet.

C—Form of Ship-Licence.

D—Form of Radio-operator's Licence.

LAW 1831.

A Concerning the organisation of the Radiotelegraphic and Radiotelephonic Service of the State and the formation of a Directorate of Radiotelegraphic Service of the Navy.

Passed, January 14th, 1920.

CHAPTER A.

General Clauses concerning the Radiotelegraphic and Radiotelephonic Service of the State.

ART. 1.—The installation and operation of Radiotelegraphic and Radiotelephonic stations on Hellenic territory and on board Hellenic ships constitutes a State monopoly.

ART. 2.—The State may grant permission to private individuals to instal and operate radio-stations on land and on board ships under conditions specified in the licence. Any such licence may be revoked or the conditions under which same has been granted be altered when the station interferes with the working of Government Stations or does not fulfil the conditions under which the licence has been issued.

In time of mobilisation of the naval or military forces the licence for the operation of private stations may be revoked without notice.

The State may take possession of private stations for its own use in mobilisation time after paying compensation as mentioned in the licence.

The State reserves to itself the right to purchase any private station in time of peace

and if the licence be revoked in accordance with the first paragraph of the present article after a certified decision of the permanent advisory board as in Article 8, compensation is fixed by a council of arbitrators composed of three members, one chosen by the competent Ministry, the second by the owner, and the third by the President of the Athens Court of Appeal.

If more than one owner is interested and these do not agree as to the choice of an arbitrator, each of them shall propose one, and the arbitrator shall be chosen from them by ballot in the presence of the arbitrator chosen by the President of the Court of Appeal.

Such a Council settles definitely any dispute regarding compensation due for the temporary seizure of the station.

ART. 3.—Radiotelegraphists operating private wireless stations must be in possession of a licence issued by the State after successful examination, and undertake the obligation to preserve the secrecy of correspondence.

Licences are valid for a term of three years and a stamp of 10 Drs. is affixed to them. When Greek subjects are concerned, the application for the issue of the licence must be accompanied by certificates proving that the applicant is not a deserter from Government Forces and has not been convicted in accordance with Article 22 of the Penal Code.

Licences for Radiotelegraphists issued before the promulgation of this law are not valid after the lapse of one year.

ART. 4.—Shall be liable to a penalty not

exceeding 20,000 Drs. and to imprisonment for a term not exceeding one year.

1. Every person who establishes a radio-station or sets any radio-apparatus on land or on board ship without a licence.

2. Any person employing an operator not holding a State licence.

3. Any person violating the terms under which the licence of installation of wireless station has been granted.

4. Any person who sends or transmits any fraudulent distress signal or who without lawful excuse interferes with or obstructs any radio communication of other stations as well as persons exhorting operators to transmit such signals.

5. Any person causing damage or destruction to the radio-apparatus.

6. Any person violating the regulations in force.

7. Any person violating the due secrecy of the radio communication.

The above penalties are imposed by the Athens Court of First Instance on the action of the competent Minister without excluding any penalty provided by the Penal Code or by the Military Penal Code in the event of a Military case.

The same Court can order the confiscation of the station whenever it might be deemed desirable according to circumstances.

In addition to the above penalties the Minister can order when he takes cognisance of such infringement of the above regulations, a temporary cessation of the service of the station confiscated, also the set and any apparatus necessary to the wireless service.

The licence of an operator punished by the Court for one of the above cases is suspended temporarily or permanently on the judgment of the Court. Should the competent Minister think that the infringement effected by the operator is not serious as to demand action, or in the event of the operator being guilty of negligence, the Minister may punish him by suspending his licence for a period not exceeding three months.

ART. 5.—The land stations of the State are divided into two classes :—

(a) Inland Radio-Stations for the transmission of official or private correspondence with ship stations or other Inland or Coast Stations of the State or Stations abroad providing that there are no private Wireless Stations.

(b) Shore or Coast Radio-stations for the transmission of official or private correspondence to ships or other coast and land stations in the State or abroad, providing that there are no private stations for wireless correspondence.

The Government stations on board ships are divided into two classes :

(a) Stations on board warships.

(b) Stations having been specially installed by the State on board merchant ships, exempted by the present law for the ships, particular use.

ART. 6.—All wireless telegraphic subjects come under the special jurisdiction of the Ministries of Marine, of Communications, and of National Economy, who are kept *au courant* with wireless telegraphic questions in connection with merchant shipping by their representative and member to the Advisory Board (provided for by Article 8). The Director of the Merchant Shipping Department, or by direct communication of the Marine Minister providing special arrangements are made.

The following come under the special jurisdiction of the Minister of Communications :—

(a) The installation and operation of the land stations.

(b) The issue of licences for the installation and operation of private land stations, the inspection and supervision of their operation, the observance of the regulations in force and the conditions stipulated in the licence, of these stations upon decision of the board provided for in Article 8.

(c) The control and payment of accounts for private radiograms transmitted by stations under his jurisdiction, or that of the Minister of Marine who in turn transmits full information concerning the subject.

For this purpose the staff of the office of the Ministry of Communications shall be fixed by special Royal Decree.

The following come under the jurisdiction of the Ministry of the Navy :—

(a) The installation and operation of the coast stations, of warship stations, and stations of the State on merchant vessels.

(b) The issue of licences for the installation and operation of private stations on merchant vessels and private coast stations after consultation with the Advisory Board, the inspection and supervision of their operation, the observance of the regulations and conventions in force and conditions stipulated in the licence of the station.

(c) The issue of licences to the operator of all stations.

(d) The control of ships or land stations and the observance of rules and conventions shall be fixed by Royal Decree and special regulations.

(e) As coast or shore stations are considered all stations installed a small distance from the coast if they keep up Naval radio-communication.

ART. 7.—Temporarily and until the formation of a Technical Service has been effected at the Ministry of Communications all matters under its jurisdiction except those stipulated in Chapter C will pertain to the Ministry of Marine.

A permanent Advisory Board is established at the Ministry of the Navy, composed of the Head of the General Staff of the Navy, as Chairman, the Director of Posts and Telegraphs, the Director of the Radio-Service of the Navy, the Head of the Radio Department of the Ministry of Communications, and one officer of the Army General Staff appointed by the Chief of the Staff, and of the Director of the Merchant Shipping Department in the Ministry of National Economy.

This Board considers :—

(a) The necessity for the erection of land stations.

(b) The issue of licences for the installations of private stations in the interior or on the coast and the cancellation of such licences.

(c) Matters pertaining to International Conventions.

(d) Questions arising between different services.

(e) Any relative matter brought forward by the Ministers of the Navy and Communications or of the Ministry of National Economy.

ART. 9.—The coast station charges and ship charges are fixed by Royal Decree according to circumstances after the consultation with the Advisory Board.

CHAPTER B.

CONCERNING THE RADIO-SERVICE ON BOARD MERCHANT SHIPS.

ART. 10.—All Greek merchant ships of 1,600 gross tonnage and over, and ships of less tonnage if they carry fifty or more persons including crew, must be fitted with a radiotelegraph set. The following are exempted from the above obligation :—

(a) Cargo-boats and sailing vessels whose voyages are not extended to an ocean.

(b) Passenger ships whose voyages are included in the parallelogram limited by 34° 0' to 42° 20' north latitude and the meridians 17° 0' to 30° 0' east of Greenwich. Passenger boats below 500 gross tonnage, undertaking fixed voyages further than the meridian 30° east of Greenwich, but in the area included by the above parallelogram, may also be exempted by decision of the Ministers of the Navy and National Economy.

In reckoning the number of persons stated in the first paragraph of this article, there are not included persons embarked exceptionally and temporarily as the result of *force majeure*, or because the master is under the necessity of increasing the number of his crew to fill the places of those who are ill, or is obliged to carry ship-wrecked or other persons.

ART. 11.—The power of the wireless sets provided for in the foregoing article will be defined in the licence and shall be able to transmit signals clearly under normal circumstances at a distance of at least 100 nautical miles in addition they shall be equipped with an emergency gear which elements shall be under the greatest safety conditions.

ART. 12.—The clearance of ships, subject according to Article 10 to carry a wireless set, and not being fitted therewith, is prohibited by the harbour authorities. The acceptance of Greek passengers on ships of foreign nationality which are not equipped with wireless is also prohibited for voyages where Greek ships are required to be equipped.

ART. 13.—Merchant ships exempted from the obligation to be fitted with a wireless set, may be fitted with State apparatus for purposes of the War-Navy. All expenses of installation and maintenance of the necessary staff for the operation being reserved to the competent Ministry.

ART. 14.—All ship radio-charges are deducted from the general radio-charges and belong to the shipowner or to any person having the exploitation of the radio-station under special arrangement with the shipowner.

In cases where the ship helps in salvage or affords assistance to another ship in consequence of a radiogram the shipowner is required to pay to the State 10% of the net sum which he obtains for salvage, but only if the apparatus belongs to the State. This sum being devoted to the Naval *Caisse des Invalides*.

CHAPTER C.

CONCERNING THE RADIO-SERVICE OF THE NAVY.

ART. 15.—A Direction of Radio-Service of the Navy is formed in the Ministry of the Navy under the immediate orders of the Minister of Marine and to which, in addition to matters specified in Article 6 of this law, are subject : The enlistment, training, appointment and alterations of the staff serving on stations

subject to the jurisdiction of the Ministry of the Navy or any other relative matter to be fixed by Royal Decree.

(Further articles concern the special service of the Naval Radio-Corps.)

REGULATION OF WIRELESS SERVICE ON MERCHANT SHIPS.

CHAPTER I.

SHIPS BOUND TO BE FITTED WITH RADIO-TELEGRAPH INSTALLATION.

B 1. All Greek merchant ships of 1,600 gross tonnage and over, and ships of less tonnage, if they carry fifty or more persons including crew, must be fitted with a radiotelegraph set. The following are exempted from the above obligation :—

(a) Cargo-boats and sailing vessels whose voyages are not extended to an ocean.

(b) Passenger ships whose voyages are included in the parallelogram limited by 34° 0' to 42° 20' north latitude, and the meridians 17° 0' to 30° 0' east of Greenwich. Passenger boats below 500 gross tonnage, undertaking fixed voyages further than the meridian 30° east of Greenwich, but in the area included by the above parallelogram may also be exempted by decision of the Ministers of the Navy and National Economy.

In reckoning the number of persons stated in the first paragraph of this article there are not included persons embarked exceptionally and temporarily as the result of *force majeure*, or because the master is under the necessity of increasing the number of his crew to fill the places of those who are ill, or is obliged to carry ship-wrecked or other persons.

2. The power of the wireless station on merchant ships is fixed by the Direction of the Radiotelegraphic Service of the Navy (D.R.S.N.), and is prescribed in the licence according to the voyages undertaken by the various ships. As a minimum limit should be taken the clear transmission of signals to a distance of at least 100 naval miles under normal conditions. In addition merchant ships must be fitted with an emergency set, the whole system of which must be kept in the safest condition. The accumulators must be placed out of the wireless cabin and if possible in the open air in dry cases. The wireless cabin must be connected with the bridge by some safe means assuring verbal communication.

3. Each shipowner, obliged by this law to instal a radiotelegraph station on his ship, must submit an application to the D.R.S.N. (Inspection Department) for the necessary licence.

In the application the following items of the ship must be prescribed :—

- (1) Dynamo—how moved and where placed.
- (2) Masts—distance between and height.
- (3) Capacity (deadweight).
- (4) Passenger or cargo.
- (5) Number of crew.
- (6) Voyages undertaken.
- (7) System of the radiotelegraphic station to be installed.
- (8) Length of aerial.
- (9) Wave system.
- (10) Wavelengths used.
- (11) Emergency set.

After the installation the shipowner submits to the D.R.S.N. :—

- (1) Small drawing of the aerial.
- (2) Small drawing of the connections.
- (3) Disposition of the set in the cabin.

The responsibility for the accuracy of these certificates is borne wholly by the shipowner.

The D.R.S.N. on granting the necessary licence can accept the above items or change them, the shipowner being obliged to comply with the suggestion of the D.R.S.N.

4. Shipowners not bound by law and wishing to instal a radio set on their ships must apply by a similar application as above.

5. The D.R.S.N. on granting a licence assigns the call letters to the station.

6. Merchant ships are divided into three classes, A, B, C, as regards the wireless installation :—

Class A.—To this class belong all the passenger ships travelling at a distance of more than 200 miles from the coasts. The ships of this class must be in permanent watch.

Class B.—To this class belong all other ships which are bound by law to be fitted with a radiotelegraphic installation; the ships of this class are bound to keep limited watch during the voyage which is regulated in accordance with the needs of the voyage. In any case the station of these ships must be in watch the first ten minutes of each hour.

Class C.—To this class belong all ships fitted with wireless installation without being bound by law. The station of these ships have no fixed watches.

CHAPTER II.

SERVICE OF WIRELESS STATION ON MERCHANT SHIPS.

9. The wireless stations service of Greek merchant ships must be carried out by telegraphists holding a Greek licence granted in accordance with Law 1831 by the D.R.S.N.

10. The stations of ships of class A are served by two operators at least, holding a first-class licence.

11. The stations of ships of class B are served by at least one operator holding a first-class licence.

In cases where no second operator is carried a member of the crew must be able to understand the distress signal or the call of another station, so that he may at once inform the telegraphist.

Such skill of the said man of the crew shall be tested and mentioned in the respective report of the Wireless Inspector.

12. The station of a ship of the C class must be served by at least one operator holding a second-class licence.

13. The operator of the ship in charge of the station is responsible for the regular carrying out of the service, the keeping up of books, the cleaning and maintenance in good order of the apparatus. The other operator must obey him.

14. Each merchant ship station must be supplied with the following papers :—

- (1) The licence for the installation.
- (2) A copy of the present Wireless Regulation and of any other subsequent or of any circular concerning the radiotelegraphic service.
- (3) A copy of the International Wireless Convention and of annexed regulation.
- (4) The official list of wireless stations and alphabetical list of call letters.

(5) Radiogram prints.

(6) A copy of the standing wireless and cable rates and the protocol of the wireless station.

(7) A log-book for the wireless station.

The operator will state from time to time on a slate placed out of the wireless cabin the coast station with which he is in touch.

15. The operator on service shall keep in a log-book of the station a record of all orders received and all other observations connected with the wireless service and any infringement of the regulations.

The log-book of the station will be considered as an official document and it is forbidden to detach leaves therefrom or to use erasers on its pages. It may thus serve as means of proof before the courts and the competent authorities.

16. The wireless station on a merchant ship and the operators serving it are under the direct orders of the captain who regulates their watch on his own responsibility. But the operator is responsible for any signal or call of the station or any message which he receives and has not passed in the protocol of the station.

17. The captains of the merchant ships must take the necessary steps to secure during the voyage the necessary electric power for the transmitting set for the regular service of the station.

18. When the captain, on his own responsibility, forbids communication or orders silence to a station's call, or in general gives orders to the operator contrary to the regulations or hinders the operator in the fulfilment of his duties in any way, the latter must call the captain's attention to the fact, and if the captain insists, the operator must obey stating the fact in his log-book, and as soon as the ship arrives at a Greek port he must report the case to the wireless inspector or in the latter's absence to the harbour master.

19. The correspondence and the service in general of merchant ships is carried out in accordance with the regulations annexed to the International Radiotelegraphic Convention of London and with the present regulation, as well as with any other order of the D.R.S.N.

Operators are also bound to carry out all orders and to comply with the instructions given by the wireless inspector.

20. On no account may a ship station use other call letters than those prescribed in the licence.

21. The transmission of radiotelegrams in harbours or bays in the proximity of coast stations is prohibited.

22. Merchant ship stations are bound to suspend transmission as soon as a coast station requires it. As a general rule the ship stations must comply with the orders given by the coast stations.

23. In time of mobilisation or Naval manoeuvres the ship stations must conform to the instructions given by the Greek Navy.

24. Before leaving port the operator in charge of the station must try the working condition of the main and emergency set. This test, however, is carried out by disconnecting the aerial. Whenever the operator thinks it necessary to verify the radiation of the station and its emergency set or the sensitivity of the receiver he applies for it, using the international abbreviation.

25. The operators in charge of merchant ships are bound when they proceed to a Greek harbour, to report at once to the wireless

inspector or to the harbour officer all deficiencies of the station and in his personnel.

26. The captain is bound at specified intervals not exceeding four hours to give the operators the position of the ship which is to be constantly suspended under their view in the receiving cabin.

27. The operator receiving (by any means) knowledge of a message dangerous to the interests of the country must report it at once to the captain and to the nearest Government coast station or warship or harbour authorities, and simultaneously must draw up a report embodying the message, the station in communication, and full information on it, which he forwards to the D.R.S.N.

28. If the wireless operator receives a suspicious message for transmission from a passenger, before transmitting it he must ask the permission of the captain.

29. It is forbidden for operators to undertake service at a station not fitted with a regular licence.

30. All operators must carry their licence in the ship to which they belong.

31. It is forbidden for operators to maintain communication by wireless on subjects not referring to the wireless service.

32. Whenever the operator hears any infringement of the rules, effected by other stations he must report at once the fact with all necessary particulars to the D.R.S.N. and he will record in his log-book exactly what he has heard.

33. It is absolutely forbidden for a third station to interrupt two stations already communicating.

34. As a general rule wireless operators must constantly recognise that it is of their duty to enable the wireless communication to be carried out regularly and not to be absorbed exclusively by the finishing up of their service in the station they belong to.

35. It is forbidden to every person not concerned in the service of the station to enter the wireless cabin.

36. Captains are bound to supply the necessary personnel for the cleaning of the station and the repair of the aerial and of the set and generally to grant all assistance for the maintenance and regular service of the station.

37. Merchant ships operators hold officer's rank of the merchant fleet.

38. Operators on finally landing from a merchant ship must present their licence to the captain before landing who endorses on it the capacity and character of the operator as shown during his service period.

CHAPTER III.

PENALTIES FOR THE VIOLATION OF THE LAW AND THE REGULATION.

39. Shall be liable to a penalty not exceeding 20,000 Drs. and to imprisonment for a term not exceeding one year.

(1) Everyone who establishes a wireless station or sets any radiotelegraphic apparatus on land or ship without a licence.

(2) Any person employing an operator not holding a State licence.

(3) Any person violating the terms under which the licence of installation for wireless has been granted.

(4) Any person violating the regulations in force.

(5) Any person who sends or transmits any false or fraudulent distress signals or who

without lawful excuse interferences with or obstructs any radio communication of the station.

(6) Any person causing damage or destruction to the radiotelegraph apparatus.

(7) Any person violating the due secrecy of the radio communication.

(8) Any person violating generally any regulation of the rules in force.

40. The above penalties are imposed by the Athens Court of First Instance on the action of the competent Minister without excepting any penalty provided by the penal code or by the military penal code in the event of military case.

41. The same court can order the confiscation of the station whenever it might be deemed desirable according to circumstances.

42. In addition to the above penalties the Minister can order when he takes cognisance of such infringement of the above regulations, a temporary cessation of the service of the station confiscated, also the set and any apparatus necessary to the wireless service.

43. The licence of an operator punished by the court for one of the above cases is suspended temporarily or permanently on the judgment of the court. Should the competent Minister think that the infringement effected by an operator is not so serious as to demand such action, or in the event of the operator being guilty of negligence, the Minister may punish him by suspending his licence for a period not exceeding three months.

CHAPTER IV.

INSPECTION OF THE WIRELESS STATIONS OF MERCHANT SHIPS.

44. In harbours specified by order of the Minister of Marines there are centres for Inspection of wireless in active service.

45. In these centres there are Inspectors of the corps of the wireless operators of the War-Navy to superintend the application of Law 1831, of the International Convention and the Regulations for Wireless Telegraphy which are in force.

46. The Inspectors communicate directly with the harbour officers and co-operate with them in order to enforce the law.

47. The Wireless Inspectors, or failing them, the harbour officers, inspect the ships affected by the law before their departure and verify whether they are fitted with wireless as well as with the necessary personnel and the class of operators in accordance with the law and the present regulations.

48. The Wireless Inspector who discovers an infringement of the law or the regulations reports it simultaneously to the harbour master who either prevents the leaving of the ship in accordance with law or reports the infringement effected to the D.R.S.N. asking for the suspension of the responsible operator or the imposition of a penalty according to the nature of the infringement effected.

The Harbour Master accompanies such report with a detailed report concerning the transgression committed, signed by him and the Wireless Inspector, and if need be accompanied by a sworn statement to this effect, which he may obtain from any person acquainted with the fact. He also submits any other item which might be useful to the court.

49. If the inspection of the ship station is impossible the Inspector or the Harbour

Officer can ask for a written statement from the captain testifying that the station is maintained in good condition.

50. The Wireless Inspector can accept as a proof of the efficiency of the set and the capacity of the operators of the ship under examination, radiograms transmitted or received during the lapse of the last voyage to the harbour where they are from a distance of at least 100 miles.

51. For any obstruction or difficulty caused by the captain or other person of the ship with regard to the service and the duties of the Inspectors or the Harbour Officers the captain of the ship will be held responsible and against whom the Harbour Master may at once order legal proceedings to be taken.

52. The captain is responsible if he sail from any harbour where there is an Inspector without having his wireless installation in order or the requisite number of operators.

53. All consequences of the law concerning the infringement of the regulations will be enforced against the captain or the shipowner or against both according to the circumstances.

FORM OF SHIP LICENCE.

KINGDOM OF GREECE.

No.....

DIRECTION OF THE NAVAL RADIOTELEGRAPH SERVICE.

C In accordance with Law 1831, with the London Wireless Convention of 1912, and with the Regulations on the Wireless Service of the Merchant Fleet, we grant the licence for the erection and operation of wireless station on board s.s. of tons deadweight, registered at Belonging to

The technical particulars of the station are as follows:—

Station Class Call letters
Power System
Aerial length Wavelength
Receiver

Back Part.

PHOTO

Locality and date of birth.....
Remarks
Signature

SERVICE CONTROL.

Station Name.	Service Time.	Remarks.	Signature of person in charge or of the Captain.

GRENADA

(See map on p. 311.)

GRENADA, and the chain of small islands called the Grenadines, lie between 12° 30' and 11° 58' N. latitude, whilst their longitude is included between 61° 20' and 61° 35' W. The total area of the colony is estimated at about 85,120 acres. Originally settled by the French, it was definitely ceded to Great Britain in 1783. The control is vested in the Governor, an Executive Council, and a Legislative Council, both consisting partly of nominated and partly of official members. There are no wireless clubs or societies in the colony.

Emergency set
Electric power
Staff

The operation of the station is subject to the provisions of the above laws, conventions and regulations, as well as to provisions of all regulations issued by the Direction of the Naval Radiotelegraph Service.

The present licence is valid as long as the London Convention of 1912 is in power, and is revocable for any case referred to in Law 1831.

Athens, the.....19..

The Director of the Naval Radiotelegraph Service.

KINGDOM OF GREECE.

No.....

DIRECTION OF THE NAVAL RADIOTELEGRAPH SERVICE.

OPERATOR LICENCE.

..... CLASS.

D Mr..... has been examined successfully on the following matters:—

- (a) Operation and regulation of apparatus.
- (b) Transmission and reading of signals at a speed of at least words per minute.
- (c) Knowledge of the regulations on the wireless communication.

The above-mentioned has undertaken the obligation of maintaining the secrecy of Radio communications, and therefore the present licence is granted owing to which he may undertake Wireless Service in Greek merchant vessels as well as at land stations.

The present licence is valid for a term of three years beginning to-day and as long as the London Convention of 1912 is in force.

The present licence is temporarily or definitely revocable for any obstruction, according to Article 4 of Law 1831, of which he has knowledge.

Athens the.....19..

The Director of the Naval Radiotelegraph Service.

ADMINISTRATION.

Wireless telegraphy is regulated by the following Ordinances and Regulations :—

A—Wireless Telegraph Ordinance, 1903.

B—Wireless Telegraph Amendment Ordinance, 1913.

C—Regulations of February 1st, 1913.

D—Regulations of August 3rd, 1914.

WIRELESS TELEGRAPH ORDINANCE
1903.

A In this Ordinance the term "Wireless Telegraphy" means any system or installation designed or constructed for the transmission or receipt of any messages or communications to or from a distant place by means of electric currents and signals generated by any apparatus or instrument which system, installation or instrument is unconnected by wire or other tangible attachment with such distant place. The term "Wireless Telegram" means any message or communication transmitted, or intended for transmission, by wireless telegraphy.

2. The Governor-in-Council and the servant, of the Government of the Colony shall have the exclusive privilege of installing, erecting, maintaining, and using in this Colony apparatus intended for wireless telegraphy, and also the incidental services of transmitting, receiving, collecting or delivering wireless telegrams.

3. It shall not be lawful for any person to instal, erect, maintain, or use in this Colony any apparatus or instrument for the purpose of wireless telegraphy without having previously obtained from the Governor a licence in that behalf to be granted on such terms and conditions as the Governor may prescribe.

4. Any person contravening the provisions of this Ordinance shall be liable on conviction to a fine not exceeding Fifty Pounds, and the apparatus and installation in respect of which a conviction is obtained may by order of the Magistrate before whom such conviction is obtained be forfeited to the use of His Majesty the King.

5. All proceedings under this Ordinance may be taken before the Magistrate of the Southern District or any other person appointed by the Governor for the purpose of hearing and deciding the case; and the mode of procedure shall be according to the law in force for the time being in respect of other offences punishable on summary conviction.

6. This Ordinance may be cited as "The Wireless Telegraph Ordinance."

THE WIRELESS TELEGRAPH AMENDMENT
ORDINANCE, JANUARY 15TH, 1913.

B Be it enacted by the Governor with the advice and consent of the Legislative Council of Grenada as follows:
1. The Governor-in-Council may make regulations.

(a) Prescribing the form and manner in which applications for licences under the Principal Ordinance are to be made and the fees payable on the grant of any such licence;

(b) Governing the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in the territorial waters of the Colony; and

(c) Generally for the purpose of carrying the principal Ordinance into effect.

2. Any person committing a breach of any regulation made under this Ordinance shall be liable on summary conviction to a fine not exceeding Twenty Pounds.

3. (1) This Ordinance shall be cited as the Wireless Telegraph Amendment Ordinance, 1913, and shall be read as one of the Wireless Telegraph Ordinance, and may be cited therewith as the Wireless Telegraph Ordinances, 1911 and 1913.

(2) The Wireless Telegraph Ordinance is herein referred to as the Principal Ordinance.

Passed the Legislative Council this tenth day of January, in the year of our Lord one thousand nine hundred and thirteen.

C. LIVINGSTON WILSON,
Clerk of Councils.

REGULATIONS WITH RESPECT TO THE USE OF
WIRELESS TELEGRAPH APPARATUS ON
MERCHANT SHIPS.

(Gazetted February 1st, 1913.)

C Under the authority of section one of the Wireless Telegraph Ordinance, 1913, the following regulations are hereby made by the Governor-in-Council:—

1. In these regulations the expression "merchant ship means any merchant ship" whether British or foreign.

2. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph established on ships at sea.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such a ship is in any of the harbours of the Colony except with the special or general permission of the Colonial Postmaster.

4. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Made by the Governor-in-Council this 31st day of January, 1913.

C. LIVINGSTON WILSON,
Clerk of Councils.

REGULATIONS MADE BY THE GOVERNOR.
(Gazetted August 3rd, 1914.)

D Whereas it is provided by section 4 (3) of the Wireless Telegraphy Ordinance, 1913, that if at any time in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time; and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas in my opinion such emergency as aforesaid has arisen:

Now I do hereby make the following further regulations—namely:—

1. The Governor may appoint any person to take possession and control of the apparatus for wireless telegraphy on board of any merchant ship while in the territorial waters of the Colony.

2. Any person so appointed may enter upon any such ship and take possession of the aforesaid apparatus thereon on behalf of His Majesty, and use the same for His Majesty's service and subject thereto for such ordinary services as to the said person may seem fit.

3. Any such person may instead of taking possession of such apparatus as aforesaid direct the master of the ship to submit or cause to be submitted to him all messages intended for transmission or arriving by the said apparatus or any class or classes of such messages, to stop or delay the transmission of any message or deliver the same to him, and generally to obey all such directions with reference to the transmission of messages as such persons may prescribe, and the master of the ship shall obey and conform to all such directions. Any master failing to obey and conform to any such direction shall be liable on summary conviction to the penalties under the Ordinance provided.

Made by me under the provisions of the Wireless Telegraphy, 1913, this third day of August, 1914.

DOUGLAS YOUNG,
Acting Governor.

GUAM

(See map on p. 139.)

GUATEMALA

THE Republic of Guatemala lies south-eastward of Mexico, and is almost shut off from the Atlantic Ocean by British Honduras on the north and by the Republic of Honduras on the south-east. Puerto Barrios and Livingston constitute the chief ports of the Republic on the Atlantic seaboard; San José (the chief port), Champerico and Ocos on the Pacific. The Republic in its present form was established on March 21st, 1847, after having formed part, for 26 years, of the Confederation of Central America. The Constitution dates from December, 1879, modified in 1885, 1887, 1889, and 1903.

CONTROL AND ORGANISATION.

At the present moment radiotelegraphy is represented by a private Government station at Guatemala City. This installation is nominally under the supervision of the Minister of Public Works, but is entirely under the personal direction of the President. An American operator named Mr. J. H. Watts, of the U.S. Navy, has been lent to the Government for the purpose of superintending the working.



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ADMINISTRATION.

No laws and regulations have up to the present been issued in Guatemala to regulate the use of wireless.

HAITI

(See map on p. 398.)

THE Republic of Haiti occupies the western (French-speaking) portion of the Island of San Domingo,* which ranks only second in size to Cuba amongst the West Indian Islands. Its area is estimated at 10,200 square miles.

CONTROL.

The Republic does not itself possess any wireless stations, and has passed no regulations affecting telegraphy. The various stations which do exist in the island all constitute items in the American occupation, and remain under the supervision of U.S.A. officials.

HAWAII

(See UNITED STATES OF AMERICA.)

HOLLAND

(See NETHERLANDS.)

HONDURAS (BRITISH)

(See BRITISH HONDURAS.)

HONDURAS (REPUBLIC OF)

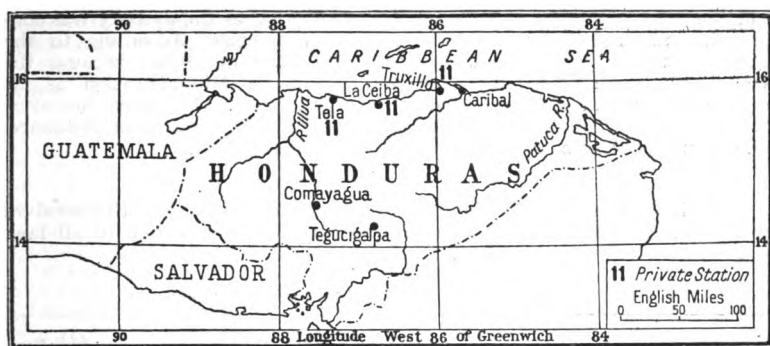
HONDURAS is a Republic, proclaimed September 15th, 1821, and is governed under a charter proclaimed October, 1894. The Legislative Power is in the hands of a Congress of Deputies of 42 members, chosen for four years directly by popular vote, in the ratio of one per 10,000 inhabitants. The executive authority rests with the President, nominated and elected by popular vote for four years. The number of electors is about 110,000. The Republic is administered by a Council of six ministers, with the portfolios of Foreign Relations, Government of Justice, War and Marine, Treasury and Public Credit, Public Works and Agriculture, and Education.

The area of the Republic is about 44,275 square miles, which lie between the Atlantic on the north and the Pacific on the south. The Atlantic coast line is the more important, as it forms the seat of the banana industry, and contains the only railroads in the country. The chief towns on the north coast are Puerto Cortes (the head of the railroad leading inland to San Pedro Sula, one of the most important towns in the country), Tela, La Ceiba, Trujillo, and Omoa. On the south coast Honduras has only a small coast line on the Gulf of Fonseca, with a port on Tiger Island called Amapala. This constitutes the chief port for the capital, Tegucigalpa, goods and passengers being carried across the gulf to the small port of San Lorenzo, and thence by automobile and oxcarts over the fine national highway to the capital, a distance of 80 miles.

CONTROL AND ORGANISATION.

The first wireless station was installed during 1912 at the port of La Ceiba by the Vaccaro Brothers Railroad and S.S. Company.

* For Wireless Organisation and Laws current in the Dominican Republic see under Santo Domingo.



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There are other stations at Cuyamel, Tela, and Trujillo.

All these stations belong to private companies, and are without any co-ordination, being used only by the various companies to maintain communication with their own steamers. Under favourable atmospheric conditions they can work with New Orleans, but ordinarily they communicate with the Isla del Cisne (Swan Island), in the Caribbean Sea. They are more or less of the type of that at Tela, which has a transmitter of 5 kw., and aërials sustained by towers 250 feet high.

The Government has recently ordered a course of wireless to be included in the studies of the Military School at Tegucigalpa, and has installed a teaching set. There are no manufacturing plants in the Republic.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address
Excmo. Señor don Jesus M. Alvarado	Secretario de Estado en el Despacho de Fomento, Obras Públicas y Agricultura	Tegucigalpa
Licenciado don Antonio Castillo Vega	Sub-Secretario de Estado en el Despacho de Fomento, Obras Públicas y Agricultura	Tegucigalpa

ADMINISTRATION.

According to the Law of Telegraphs of the Republic, this branch of Telegraphy is the exclusive right of the State, but this right has been made over to private companies on the north coast, in the form of concessions, under the following conditions:—

"The concessionaire has the right to construct, maintain, and use, in order to direct the service of his steamships, and those contracted by him, wireless stations; these cannot be placed in public service without previous arrangement with the Government. Said Government shall have the right, in times of peace or of war, to use such installations, without remuneration for the concessionaire, and even to direct and control, exclusively, the service of same, by its own employees."

These concessions granted by the Government were approved by Congress.

HONG-KONG

(See CHINA, FOREIGN SETTLEMENTS.)

HUNGARY

HUNGARY was founded in the ninth century by the Magyars. Constitutionally speaking the method of government has always been monarchical. By the Convention of 1723 (*Pragmatica Sanctio*) Hungary

and Austria together formed a single territory as far as the dynasty was concerned, and in consequence for purposes of defence. According to the Convention of 1867 the Commonalty was further developed because the Austro-Hungarian Monarchy possessed a common Administration as far as the Army and Foreign Affairs were concerned. The war, however, changed all this, and as a result Hungary acquired her entire independence. The form of government remains in principle monarchical.

CONTROL.

Radiotelegraphy is at present controlled by the Director-General of Posts and Telegraphs who is responsible for the promulgation of all laws and regulations relative thereto.

OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mons. Charles Demény	Secretary of State and Director-General of Posts and Telegraphs	Budapest

ORGANISATION.

A large station, with a range of 3,000 km., situated at Csepel, near Budapest, was established on November 18th, 1914, whilst a trial station has been erected at Budapest itself. Wireless apparatus has been installed in many of the schools throughout the country. No stations exist for aviation or meteorological purposes.

ADMINISTRATION.

A law concerning aviation in connection with radiotelegraphy is in course



of preparation, but detailed particulars are not yet available. No arrangements are contemplated regarding Time and Weather Signals.

Radiotelegraphy is governed by the following law, the text of which is printed below:—

A—Decree No. 62574/13, dated October 16th, 1913.

B—Form of Ship Licence thereunder.

C—Form of Certificate for Ship Stations.

D—Form of Certificate for Operators.

DECREE OF THE HUNGARIAN MINISTER OF COMMERCE WITH REFERENCE TO THE FITTING UP OF WIRELESS STATIONS ON HUNGARIAN SEA-GOING PASSENGER SHIPS.

A In accordance with paragraphs 24 and 27 of the Supplement to my Order No. 60,805, issued on August 21st of the current year, in the matter of authorising the placing of service of commercial sea-going ships, the safety appliances provided on them and the provision of the navigation service in connection with working them, passenger liners already in service, which make regular voyages from Hungarian ports to points beyond Gibraltar or Aden and are carrying passengers, are to be fitted with wireless apparatus of the description specified below not later than by February 1st, 1915: new ships, on the other hand, must be fitted with such apparatus before they are put into service. Such apparatus must be sufficiently powerful to be able to send or receive messages under ordinary conditions over a minimum distance of 100 sea miles.

In order to carry out this decree I order the following:—

1. The owner (or charterer) is obliged to apply to the Hungarian Minister of Commerce for permission to establish a wireless station on board.

Such application must be accompanied in quadruplicate by a technical description of the apparatus to be used, with a diagram of the connections. Any subsequent alteration in the system, or remodelling of any description of the apparatus, which may affect its capacity for sending or receiving messages, must receive the preliminary authorisation of the Hungarian Minister of Commerce.

2. The arrangement of the wireless station on the ship must be up to date and comply with Rule 3 of the London International Wireless Agreement, so that the station may be able to work in harmony with the working of wireless stations using other systems and be able to exchange messages with such other stations. The system to be adopted and to be used will depend on the preliminary authorisation of the Hungarian Minister of Commerce.

The apparatus must be of such a type that it can be adjusted for waves 300 and 600 metres long and with these be able to send or receive 20 words at least per minute, counting five letters to the word.

In the case of applying subsections 2a to 2d of paragraph xxxv of the London International Wireless Service Regulations, the apparatus on the ship will be allowed to make use also of wavelengths of 1,800 metres.

3. All the machinery and materials for fitting up the wireless station on the ship must be acquired in the home country as far as possible.

Machinery and materials to be used for such purpose may only be acquired from abroad with the special permission of the Hungarian Minister of Commerce. Service books and similar other stores and office requisites for the working of the wireless service will be supplied at cost price by the Chief Post and Telegraph Administration.

4. All ships fitted either for continuous or restricted wireless service, must in addition to the usual apparatus be fitted also with apparatus for sending out wireless distress signals in conformity with Rule xl of the London Wireless Service Regulations as ordered by and in a manner fixed by the Hungarian Minister of Commerce.

Such apparatus for sending out wireless distress signals must be provided with its own separate power supply independently of any other power supply not used for the wireless service on board and must be of a design that it can be put in action expeditiously and be kept at work continuously for at least six hours and at the same time be powerful enough to send signals over a distance of at least 80 sea miles, on ships having a continuous wireless service and over at least 50 miles on ships with restricted wireless service.

This special installation for sending out distress signals may be omitted on all ships on which the regular wireless installation is able to fulfil these requirements.

5. The speed at which signals can be sent and received will be set out by the Hungarian Minister of Commerce in the document granting permission to establish a wireless service on a ship.

As regards new inventions for materially improving the efficient working of the apparatus and the speed of sending and receiving messages, the Hungarian Minister of Commerce may compel the owner (or charterer) of the ship to adopt such invention or inventions within a fixed period for the wireless station on his ship with due regard to existing practical requirements and a fair consideration of the expenditure incurred in connection therewith.

6. Under ordinary conditions the electrical power for working the wireless apparatus may not exceed one kilowatt. A greater power than this may only be used if the nearest station on the coast with which it is desired to exchange messages is situated at a greater distance than 200 sea miles or if on account of obstacles extant it is necessary to use the larger power (London Wireless Service Regulations, Rule viii).

7. The Chief Post and Telegraph Administration is empowered to have the wireless installation examined by its own inspectors at any period and to control the service.

The owner (or charterer) of the ship is obliged to afford to the inspectors of the Chief Post and Telegraph Administration, and with the intervention of this Administration to officers appointed by the Navy every facility

to make themselves thoroughly familiar with the working in every detail of the wireless apparatus and gear and to acquire the necessary practice in working the apparatus.

Any stipulation on the part of the supplier of the apparatus that certain parts or details of the apparatus are to be kept secret and not to be shown to the inspectors of the Chief Post and Telegraph Administration or to officers of the Navy must not be accepted by the owner (or charterer) of the ship.

All inspectors and naval officers deputed to control or learn the working of the apparatus must be carried on the ship cost free by the owner (or charterer) of the ship in a class corresponding to their rank (with cabin accommodation in accordance therewith also free) and to charge them for their board at cost price.

Not more than two such persons, however, may travel on these conditions on the same voyage.

8. The nature of the service of the wireless station on the ship (whether public or special service, etc.), and its duration (whether continuous, restricted or service without special fixed hours), also the number and qualification (1st class or 2nd class) of the wireless operators, will be set out by the Hungarian Minister of Commerce in the document granting permission for the installation.

9. The Hungarian Minister of Commerce reserves himself the right to suspend at any time the wireless service on the ship for an indefinite period or permanently or in respect of certain special classes of messages without divulging his reason for so doing or without rendering himself liable to the payment of an indemnity.

In the case of an order for mobilisation in the Hungarian Monarchy being issued or in the case of war the wireless service on the ship is to be suspended altogether unless the captain of the ship receives special instructions to the contrary from the Chief Post and Telegraph Administration.

The captain of the ship will be held personally responsible for the carrying out of this regulation.

In other respects in time of mobilisation or war the owner (or charterer) of the ship is bound to carry out the special orders to be issued for the occasion.

10. Wireless operators to be employed may only be Hungarian citizens with a blameless record who can speak and write the Magyar language thoroughly and have obtained a certificate of qualification as regards wireless operating from the examining committee appointed by the Hungarian Minister of Commerce for the purpose.

The individuals thus qualified are to take the oath of loyalty in the presence of the examining committee, such oath to include promises to attend to their duty and to keep all messages secret, the fact of their having taken the oath being recorded on their certificate of qualification.

The wireless operators on board are subject to the discipline on the ship, must each possess their service books, and are to be placed on the list of the crew.

The owner (or charterer) of the ship is only allowed to have such individuals trained for the wireless service who have been chosen by the Hungarian Chief Post and Telegraph Administration for such purpose from a preliminary list of candidates submitted to the Administration.

Every wireless operator whose certificate is cancelled by the Hungarian Post and Telegraph Administration is to be dismissed immediately.

The owner (or charterer) of the ship is bound to give immediate notice of any change in the personnel of wireless operators to the Chief Post and Telegraph Administration and to the Hungarian Naval Authorities.

11. Every wireless station established for public service may be used by the public for sending wireless messages against payment of the proper fees.

The tariff of fees for wireless messages is fixed by the Hungarian Minister of Commerce on the recommendation of the Company. These fees are retained by the owner of the wireless station on board.

12. Out of these fees received by the owner (or charterer) of the ship for wireless messages he is responsible for the portions due to the inland and foreign telegraph authorities for forwarding messages.

In administrative matters the owner (or charterer) of the ship, or the wireless station on board, may only communicate with foreign telegraph administrations or with the International Bureau at Berne of the Telegraph Association through the Hungarian Chief Post and Telegraph Administration.

13. In conformity with Rule 3 of the London Wireless Agreement the wireless station on board is bound to enter into communication with every wireless station ashore or established on any ships regardless of the system used by such stations for the purpose of exchanging messages, and in accordance with Rule 9 the wireless station on board is compelled to accept distress signals from any source whatever, to reply to these and to take the necessary steps.

Wireless stations established on ships are to pay particular attention to the working of stations on the coast. The wireless station on board is to be kept in perpetual and efficient working order in order to be able to keep up faultless communication with the coastal stations.

At the request of the coastal station the wireless station on board is bound to stop its message immediately.

14. The working of the wireless station on board and the accounting for the fees received by such station are to be governed by the London Wireless Agreement and the service regulations attached thereto, by the St. Petersburg Telegraph Agreement and the service regulations attached thereto, and also by any orders already issued or to be issued by the Hungarian Chief Post and Telegraph Administration.

The wireless station, or the shipowner (or charterer) respectively, is bound to conform with the legal enactments and orders issued with reference to matters relating to the telegraph, telephone and electric signals.

During a stay in foreign ports the wireless station on board is bound to conform with any special rules which may be in force in the country of its sojourn besides those prescribed by the International Wireless Agreement and the regulations attached thereto.

It is the duty of the shipowner (or charterer) to make himself acquainted with these.

15. As an acknowledgment of the sovereignty of the State and in order to defray expenses incurred in the ordinary control of the wireless station on board, the owner (or charterer) of

the ship is bound to pay on the dates named, and at the receiving offices named in the document granting permission for the establishment of the wireless station, twenty (20) crowns per station per annum.

Should it become necessary to institute an inquiry owing to any neglect or fault on the part of the owner (or charterer) of the ship or one of his employees and should the enquiry establish any neglect or fault on the part of the owner (or charterer) or one of his employees, the owner (or charterer) will be bound to indemnify the Treasury for all expenses incurred in connection with such enquiry.

16. In every case of neglect or fault in or about the wireless service the Hungarian Chief Post and Telegraph Administration may mulct the owner (or charterer) of the ship in a penalty not exceeding 100 crowns providing such acts of neglect or fault do not constitute a misdemeanour or crime.

17. If after repeated warnings the wireless station on board should not do its duty, or if the working of the station should militate against public interests, the Hungarian Minister of Commerce is empowered to inflict a heavier penalty of 100 to 1,000 crowns or to issue orders to have the working of the wireless station entrusted to an individual appointed by the Minister at the expense and responsibility of the shipping undertaking, and at the same time the Minister is to have power to have all faults made good in the apparatus and have all the necessary alterations made in the apparatus at the expense of the owner (or charterer) of the ship, or as an alternative to suspend or cancel the permit for the wireless station on board.

18. The permit for the establishment and working of a wireless station on board cannot be granted for a period exceeding 20 years.

At the expiration of the period mentioned in the document granting permission the whole installation with all its accessories (including furniture and fittings) and eventually also the installation for sending out distress signals are to be handed over to the Hungarian Post Office in full efficient and faultless working condition free of charge and without liability.

Should the Hungarian Post Office not wish to take charge of the working of such wireless station thus come into their possession, but to leave it further in the hands of the owner (or charterer) of the ship, the owner (or charterer) is bound to pay twenty (20) crowns per annum over and above the fee mentioned in Clause 15 in acknowledgment of the right of ownership of the installation thus acquired by the State.

A permit given for the establishment of a wireless station on a ship is automatically cancelled by the putting out of commission of the ship and the owner (or charterer) of the ship is obliged to give notice of this to the Hungarian Chief Post and Telegraph Administration. Should it be desired to transfer the wireless installation to another ship a fresh permit for so doing will be required.

19. Moreover, the Hungarian Minister of Commerce has full power to cancel temporarily or permanently the permit for the working of a wireless station at any time even before the expiry of the period for which such permit has been granted and to cancel it without assigning any reason for his decision and to take over the working of the installation or to have it dismantled.

In the case of the working of the installation

being taken over temporarily by the Ministry, the owner (or charterer) of the ship is bound to hand over for use free of charge and without any indemnity the whole of the installation with all the apparatus, fittings and stores for working same, also the cabin and locality in which the installation is housed, together with the sleeping cabins of the wireless operators; also to supply free of cost the power required for working the installation and supply the food, render all medical service and provide attendance and other necessities required by the operators. As against this, however, all fees paid for wireless messages will be handed over to the owner (or charterer) of the ship.

The terms of the final taking over of the installation are or will be specified in the permit or in the special order issued for the purpose.

Before the installation is taken over finally under the ordinary conditions six months' previous notice will be given, but the Hungarian Minister of Commerce reserves himself the right to shorten this period if public interests should necessitate this step or even to take over the installation at any time without any previous notice whatever.

20. Should, in the unchallengeable opinion of the Hungarian Minister of Commerce, public interests require it, the Hungarian Chief Post and Telegraph Administration may—through the courts of law and without incurring any liability in respect of claims for indemnity—issue orders for any vessel being fitted with wireless installation at the expense of the Treasury to have the service maintained and to have the installation dismantled when its use is no longer required by public interests and to arrange for certain compensation being arranged in connection therewith to the owner (or charterer) of the vessel.

21. The Hungarian Minister of Commerce reserves himself the right to grant exemptions from the above regulations from case to case in conformity with practical requirements.

Hungarian Minister of Commerce.

N.
V. 191.

LICENCE.

B SEC. 1.—The Minister grants a licence to install a public wireless service station on his ship named carrying passengers and to work such station during the period while the licence remains in force under the conditions specified below.

SEC. 2.—The person to whom the licence is granted is obliged to comply with the following:—

(a) With the provisions contained in Section XXXI of the Law of 1888 and with Decree No. 23445 issued in July 1890 for carrying out this law, as well as with Decree No. 62574 issued on October 16th, 1913, for establishing wireless stations on Hungarian passenger ships.

(b) With the provisions of any law to be enacted in future as well as of any ministerial decree or order already issued or to be issued in future by the Hungarian Post Office with the same object in view.

(c) With the orders contained in the International Wireless Agreement and its service regulations.

(d) With the conditions laid down in the present licence.

SEC. 3.—The grantee is obliged to establish

the installation on board in accordance with the "Telefunken" system in a manner complying in every respect with the requirements laid down in the Wireless Service Regulations, Rule III, sub-sections 1 and 2, Rule VII, sub-section 2 and Rule VIII.

The normal distance over which the installation is to be able to exchange messages is to be at least 200 sea miles by day and at least 300 miles by night.

The normal wavelength of the installation is fixed by the Minister at 600 metres with the reservation laid down in Rules III and XXXV of the International Wireless Service Regulations.

SEC. 4.—The holder of this licence is obliged to instal besides the ordinary service installation on board an auxiliary installation in conformity with Rule XI of the International Wireless Service Regulations.

SEC. 5.—The holder of this licence undertakes to maintain permanently the two installations mentioned in sections 3 and 4 in good serviceable working condition and to introduce all improvements in accordance with the progress made by the science of wireless telegraphy.

The Minister reserves himself the right to compel the holder of this licence to adopt all new inventions of wireless practice materially enhancing the reliability and speed of exchanging messages.

All machinery, apparatus and materials to be used in fitting up the installation on board are to be obtained inland as far as possible.

Machinery, materials and apparatus of this kind may only be obtained from abroad with the special sanction of the Hungarian Minister of Commerce.

SEC. 6.—The holder of this licence has no right to alter the system of the wireless installation on board mentioned in Section 3. Generally speaking the Minister's preliminary consent must be obtained for any alteration whatever in the installation as described in the technical description or in the diagram of connections both forming a complementary part of the present licence.

SEC. 7.—The holder of this licence and his employee in handling the wireless apparatus and maintaining the wireless service must act in conformity with the International Wireless Agreement and the Service Regulations attached thereto with the rate of telegraph fees and also with parts I and II of the telegraph service rules and orders issued by the Chief Post and Telegraph Administration.

SEC. 8.—The Minister fixes the call signal of the station in the H A B group of letters, its character is to be a "P G station for public correspondence" in conformity with sub-section 4 of Rule V of the Wireless Service Regulations. As regards hours of service the wireless station is to be classed in the second category—i.e., stations with restricted hours of service in accordance with the provisions of Rule XIII, sub-section 3 of the Wireless Service Regulations.

The official hours are to be from 8 a.m. to 8 p.m.

In accordance with Rule XIII sub-section 3 of the International Wireless Service Regulations—during the periods of sailing over and above the official hours named—operators must be at their posts ready to receive messages and stay there permanently during the first ten minutes of every hour.

SEC. 9.—In conformity with the office hours

fixed in section 8 the holder of this licence undertakes to employ at least one first-class operator for attending to the service of the wireless station on board in accordance with Rule X sub-section 2 and the Wireless Service Regulations.

SEC. 10.—This operator, like all other wireless employees, must be a Hungarian citizen of blameless character who is able to write and speak the Magyar language perfectly and is the holder of a certificate of qualification for wireless operating from an examining body appointed for the purpose by the Hungarian Minister of Commerce.

The qualified individuals must take the oath of loyalty in the presence of the examining body, such oath to include promises of due attendances to their duties and to keep all messages secret, the fact of having taken this oath is to be testified in their certificate of qualification.

The employees in the service of the wireless station on board are subject to the discipline of the ship, they must be provided with service books of the ship and enrolled on the register of the crew.

As regards the wireless service these employees are subject also to the Chief Post and Telegraph Administration and must comply with the directions issued for the proper performance of the service.

The owner (charterer) of the ship may only train such individuals for the wireless service whose training is permitted by the Hungarian Chief Post and Telegraph Administration after preliminary notice of such intended training has been given to the Administration.

Every wireless employee whose certificate is withdrawn by the Hungarian Chief Post and Telegraph Administration must be dismissed immediately.

The owner (or charterer) of the ship must give immediate notice of any change in the personnel of the wireless staff to the Chief Post and Telegraph Administration and also to the Hungarian Naval Authorities.

In accordance with Rule X sub-section 4 of the Wireless Service Regulations "the service of the wireless station on board is under the chief supervision of the captain of the ship." Hence the holder of this licence must order the captain of the ship to take the oath of loyalty and for the preservation of the secret of messages, before a representative of the Hungarian Post Office.

SEC. 11.—The wireless station is intended for public correspondence and may therefore be used by anybody for sending messages against payment of the prescribed fees and observance of the rules laid down for the telegraph service.

On the other hand, in accordance with Rule 3 of the International Wireless Agreement the wireless station on board must exchange wireless messages with any and every other such station on shore or afloat—irrespective of the system used by such stations for receiving or sending wireless messages.

The operators of the wireless station on board must refuse to accept any message which, if transmitted to any part of the territory of Hungary, may endanger the safety of the Hungarian State, or the contents of which may form a breach of the country's laws or offend against public order or morality.

Should the person handing in the message still insist on its transmission the captain of the ship is to be appealed to, whose decision in this matter is to be considered final.

SEC. 12.—The fee for transmitting a wireless message from the ship is fixed at 40 fillérs per rateable word with a minimum fee of 4 crowns per message.

The Minister, however, reserves himself the right to modify this rate of fees at any time even during the duration of this licence or to fix a new tariff for messages sent.

SEC. 13.—The fees referred to in the previous section may be retained by the holder of this licence.

Messages which at telegraph stations of the State are accepted for free transmission or are transmitted on the credit system must be accepted and transmitted by the holder of this licence on the same terms.

SEC. 14.—In dealing with telegrams and preparing accounts the wireless station on board must only use dating stamps, printed forms and books that are prescribed for use and are issued for this purpose by the Hungarian Post who will supply them to the holder of this licence at cost price on his written application to the Chief Post and Telegraph Administration.

The holder of this licence is obliged under all circumstances to keep within easy reach a copy of each of the following service books for the use of the wireless station staff on board—the International Telegraph Agreement with the Service Regulations pertaining thereto, the International Wireless Agreement with the Service Regulations pertaining thereto, the Nomenclature Officielle des Bureaux Télégraphiques, the Nomenclature Officielle des Stations Radiotélégraphiques, the Liste Alphabétique des Indicatifs d'Appel, the book of telegraph rates and Parts I and II of the Telegraph Service Regulations, the book of telegraph fees issued for Hungarian wireless stations on ships, and also a copy of the Post and Telegraph Instructions. The holder of this licence must also take care that all these books are corrected and kept up to date by the wireless staff in conformity with the additions and corrections periodically issued by the International Telegraph Bureau and in the collection of Postal and Telegraph Regulations.

SEC. 15.—The holder of this licence is fully responsible financially for all claims of every kind raised on any legitimate grounds against the Hungarian Post Office by anybody for the return of fees paid or indemnification in cases arising from the service of the wireless station on board his ship.

The holder of this licence is fully responsible financially for all telegraph fees of every kind payable under International agreements in accordance with telegraph tariffs arising from the telegraph service of the wireless station on his ship.

These fees—at the financial responsibility of the holder of this licence—are collected in cash by the staff of the wireless station on his ship who are bound to keep and render correct accounts and also supply a list of all the wireless messages received, sent or relayed by the station. The Chief Post and Telegraph Administration issues proper forms for making out such accounts and lists with the necessary instructions for dealing with these forms.

The holder of this licence or the manager of the wireless station in his place—in accordance with Rule XL of the International Wireless Service Regulations—must once a month or in any case within eight days of the ship's return to port from every voyage send at the expense of the holder of this licence to the Section III of the Adult Department of the

Ministry of Commerce the following papers and documents carefully arranged and packed: the originals of all wireless messages, all records of messages transmitted all receipts for delivery of wireless messages received and all documents and accounts in connection therewith.

Prior to this, however, the holder of this licence or the manager of the wireless station in his place must prepare an account of all fees received in connection with the working of the wireless station on board and after deducting the fees due to the holder of this licence or to the wireless station on board he must pay in the remaining balance at the Hungarian Post and Telegraph Office No. 1 duly receipting on the account the sum retained by the station on the ship of the holder of this licence.

The holder of this licence or the manager of the wireless station on board respectively may only communicate with foreign telegraph authorities or with the International Bureau of the Telegraph Association at Bern through the medium of the Hungarian Chief Post and Telegraph Administration.

SEC. 16.—In home ports the wireless station may not transmit telegrams unless specially authorised to do so by the Chief Post and Telegraph Administration.

When visiting foreign parts, any special regulations in force in the country of sojourn must also be respected in addition to the regulations of the International Wireless Agreement and the Service Rules prescribed therein.

It is the duty of the owner (or charterer) to make himself acquainted with these.

SEC. 17.—The Hungarian Chief Post and Telegraph Administration may at any time have the wireless station examined by their inspectors and its service checked.

The owner (or charterer) of the ship undertakes to afford means to the inspectors of the Hungarian Chief Post and Telegraph Administration, as well as to officers of the Navy, through the mediation of the Hungarian Chief Post and Telegraph Administration to make themselves thoroughly acquainted in every detail with the handling of the wireless apparatus and to acquire the necessary practice therein.

The owner (or charterer) of the ship must not consent to any stipulation on the part of the supplier of the wireless apparatus that the arrangement of the apparatus or any part thereof should be kept secret and not be shown to the inspectors of the Hungarian Post and Telegraph Administration or to the officers of the Navy.

The owner (or charterer) of the ship undertakes to carry the inspectors and naval officers thus appointed for the study of the apparatus and training in its manipulation free of charge in a class of the ship corresponding to their rank, also to find them, free of charge, cabin accommodation and to make it possible for them to pay for their board at cost price.

Two such persons, however, may only travel on the ship on the same voyage.

SEC. 18.—As an acknowledgment of the right reserved to the State and to defray the costs incurred in the regular control of the wireless station on board, the holder of this licence undertakes to pay the sum of twenty (20) crowns to the Post and Telegraph Office No. 1 within the first half of January every year.

Should an enquiry become necessary owing to any alleged neglect or fault on the part of the owner (or charterer) of the ship or one of his

employees, and should such enquiry prove that the holder of this licence or his employee is at fault, the holder of this licence would be obliged to refund to the Treasury the whole of the costs arising from such enquiry.

SEC. 19.—The Hungarian Chief Post and Telegraph Administration has the power to mulct the holder of this licence in a penalty not exceeding 100 crowns for any neglect or fault in the wireless service provided such omission or commission does not form an act of misdemeanour or a crime. If the wireless station on board should not attend to its duties after repeated warnings, or should the service of the station clash with the public interests, the Hungarian Minister of Commerce shall have the power to inflict eventually a higher penalty of from 100 to 1,000 crowns or to make arrangements to have the wireless service of the station performed by a delegate of the Minister specially appointed for the purpose at the expense and responsibility of the shipping undertaking, and to have any apparent shortcomings in the arrangement of the wireless apparatus put right and any required alterations made at the expense of the holder of this licence, or as an alternative the Minister may suspend or cancel the licence for the working of the wireless apparatus.

SEC. 20.—The period during which the present licence will remain in force is ten (10) consecutive years counting from the date of the licence.

Should the holder of this licence not instal the wireless apparatus within a year counted from the date of the present permit, this permit will be cancelled and the holder of the licence will have to return it for cancellation to the Minister.

SEC. 21.—In accordance with the provisions of Section XXI subsection 3 of the Law of 1888 and in conformity with the decree issued by the Minister of Commerce under No. 62574 1913 in the matter of establishing wireless stations on sea-going passenger ships, the whole of the wireless installation with all its accessories (including furniture, fittings), as well as the installation for sending out distress signals, is to be handed over to the Hungarian Post Office in perfect working order free of cost and without any claims at the expiry of the period specified in the present licence.

Should the Hungarian Post not wish to undertake themselves the service of the station thus handed over to them but to leave its further working in the hands of the holder of this licence, the owner (or charterer) of the ship undertakes to make an annual payment of twenty (20) crowns in acknowledgment of the proprietary right over the installation thus acquired by the State over and above the payment specified in section 15 payment of both sums to be made simultaneously.

Should a ship be put out of commission the licence for the maintenance and working of the wireless station thereon becomes null and void and the holder of this licence shall give the Hungarian Chief Post and Telegraph Administration due notice of the fact. Should it be desired to transfer the wireless installation and re-erect it on another ship, this can only be effected under a new licence.

SEC. 22.—The Minister reserves himself the right to take possession temporarily or permanently, on behalf of the State, of the wireless station at any time even before the expiry of the present licence without giving any explanation whatever for taking such a step.

Should the installation be taken over temporarily the holder of this licence undertakes to hand over for use free of charge the whole of the apparatus with all accessories, fittings and stores for working it as well as the office wherein it is housed and the cabins for the accommodation of the operators without any claim for indemnity, also to supply free of charge the power required for working the installation, also to provide free of charge all necessaries (board, medical assistance and servants, etc.) required by the operators. As against all these services all fees collected for wireless messages are to be handed over in this instance also to the holder of this licence.

Under normal conditions six months' previous notice will be given if the installation is to be taken over permanently, but the Hungarian Minister of Commerce reserves himself the right to shorten the period of this notice or to take possession of the station at any time without any notice at all, should public interest call for such a step.

Should the working of the installation be taken over by the State permanently before the expiry of this licence, the Hungarian Post Office will indemnify the holder of this licence for the technical parts of the wireless apparatus by paying him the cost as per invoices or other evidence to be produced by him less ten (10) per cent. for every year during which the installation has been in use. The balance thus remaining will be paid to him by the Post and Telegraph Administration at Budapest.

Beyond this indemnity to be paid to him the holder of the licence shall not be able to sue in any court for any claim for loss of profit or for the payment of any other indemnity under any other pretext whatever.

SEC. 23.—The Minister reserves himself the right to suspend at any time the service of the wireless station for an indefinite period, or permanently, or for messages of a certain kind without having to assign any reason for such an order and without incurring any liability for damages caused by the suspension.

In case of an order being issued for mobilisation in Hungary, and in time of war, the wireless station on board is to be closed down altogether unless the captain receives instructions to the contrary from the Hungarian Chief Post and Telegraph Administration.

The captain will be held personally responsible for the compliance with this direction.

In other respects the holder of this licence will have to carry out all special orders to be issued in times of an eventual mobilisation or war.

SEC. 24.—This licence may only be transferred to another person with the Minister's special consent to be applied for in advance.

SEC. 25.—Should any difference of opinion arise between the State and the holder of this licence as to the correct interpretation of any of the stipulations of the present licence the matter or matters at issue shall not be referred to any Court of Justice but shall be settled by the Minister of Commerce in the usual official way, adopted by the Public Administration.

SEC. 26.—Every copy of the present licence issued officially is subject to a fixed stamp duty amounting to two crowns.

Budapest, 19 .

By the Order of the Minister,
Chief Director of Posts and Telegraphs.

CERTIFICATE.

C For the ship station on board the Hungarian vessel
 The general administration of Posts and Telegraphs of Hungary attests that the ship station on board the Hungarian vessel was installed on the basis of the licence of the Hungarian Government and that the installation of the ship station complies with the conditions prescribed by the service regulations annexed to the International Radiotelegraph Convention.

The ship station is classed in the category from the point of view of its obligations as to hours of service.

Normal range in nautical miles :

Day
 Night

Budapest, the

General Administration of Posts and Telegraphs of Hungary.

CERTIFICATE.

D The Commission, delegated by the Hungarian Minister of Commerce, has submitted Mr.

born at.....on theto an examination of the radiotelegraph service and tested his professional ability as regards :

(a) The adjustment of apparatus and knowledge of its working.

(b) The speed of—
 Transmission

.....words per minute.

Reception by sound

.....words per minute.

(c) Knowledge of the regulations applicable to the exchange of radiotelegraph communications.

In testimony whereof the Ministry of Commerce of Hungary has, by virtue of Article X of the International Radiotelegraph Convention, issued this.....Class Certificate to Mr..... who at the conclusion of the examination took the oath of secrecy of correspondence.

Made at..... the

.....19 .

ICELAND

ICELAND, known to the geographers of the ancient world as "Ultima Thule," lies in the North Atlantic Ocean between $63^{\circ} 23'$ and $66^{\circ} 33'$ north latitude, whilst its longitude extends from $13^{\circ} 22'$ to $24^{\circ} 35'$ W. Its area is estimated as 40,500 square miles, which means that it exceeds Ireland in point of size.

Colonised in the ninth century by Vikings from Norway, the inhabitants were converted to Christianity by Irish monks, and in 1000 A.D. that religion was formally acknowledged by the State.

Originally an aristocratic republic, as described in the pages of its illustrious historian, Snorre Sturlason, Iceland acknowledged the sovereignty of the King of Norway in the thirteenth century, and shared the union of the latter country with Denmark in 1388. On the partition of Europe in 1814, Denmark resigned Norway but retained Iceland.

On December 1st, 1918, an Act creating a Federal Constitution for Denmark and Iceland came into force, the two states remaining free and independent under the same sovereign. Its capital city is Reykjavik, with a population of about 13,000.

Iceland employs the metric system of weights and measures, whilst its coinage is the same as that of Denmark.



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CONTROL.

The first wireless station erected in Iceland was designed and fitted for reception only, and was put up by the Marconi Company in 1905. It was shut down in 1908. The present installation at Reykjavik was erected by the same company for the Icelandic Government in the course of 1917-18, and was opened for public service on June 17th 1918. The station at Flatey & Breidafirdi was put up by Icelandic technicians in 1919.

The State has a monopoly in the erection and working of wireless stations, but private persons or companies may be permitted to do both under a licence from the Telegraph Department.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
The Rt. Hon. Sigurdur Jonsson..	Minister of Public Works	Reykjavik
Mr. O. Forberg	Director-General of Telegraphs	Reykjavik
Mr. Paul Smith	Engineer of Telegraphs	Reykjavik
Mr. Frb. Adalsteinsson	Superintendent of Wireless Station and School	Reykjavik

Amateur Stations.—Three, only one of which is able to transmit.

Wireless Societies.—There are none devoted solely to radiotelegraphy, but the *Technical Society of Iceland* (Secretary, Otto B. Arnar) gives considerable prominence to the subject.

ADMINISTRATION.

The following legislative enactments govern wireless in Iceland :—

A—Act of November 14, 1917.

B—Regulations under the above Act.

ACT OF NOVEMBER 14TH, 1917, CONCERNING THE WORKING OF WIRELESS TELEGRAPH STATIONS IN ICELAND.

I.

A The State has a monopoly in the erection and working of wireless stations on Icelandic soil and within the territorial waters of Iceland.

II.

Within the territorial waters of Iceland, the wireless stations of foreign ships may only be in use in conformity with regulations drawn up by the Ministry of Iceland. The Ministry can prohibit all wireless communication within the territorial waters of Iceland, and take such precautions as may be necessary to ensure the observance of this prohibition.

III.

On board of Icelandic ships which do not belong to the Government, whether they are within or without the territorial waters of Iceland, wireless stations may only be erected and worked with the permission of the Ministry. If the stipulations accompanying this permission as regards the equipment and working of the station are not complied with, the Ministry can withdraw it. Applications for permission to work wireless stations that are in operation when this Act comes into force must be sent to the Ministry not later than eight weeks from the date of this Act. The Ministry will then decide how their future working is to be carried on.

IV.

On Icelandic soil, and within the territorial waters of Iceland, wireless stations, or other means of wireless communication, can only

be installed and worked with the consent of the Ministry, and in conformity with the stipulations made by it.

V.

The Regulations contained in the fifteenth paragraph of the Telegraph Act of October 20th, 1905, imposing secrecy upon those engaged in the telegraph service, are equally applicable to wireless operators. Paragraph 16 of the same Act, regarding the same obligation of those engaged in private telegraph service, is also valid as regards wireless telegraph operators on board of ships.

VI.

The violation of this law, or of the Regulations which the Ministry are hereby empowered to make, shall be punished with fines, or with imprisonment for a term not exceeding six months, provided the violation does not involve a more serious punishment. Further, all apparatus illegally installed or worked shall be confiscated. Lawsuits arising from violations of this law, or the corresponding Regulations of the Ministry, shall be tried in public police courts.

WIRELESS TELEGRAPHY AND TELEPHONY REGULATIONS.

B

I.

In the present Regulations :

(a) *Wireless station* means apparatus or other means of conveying signals to a distant point without any intermediate conductor.

(b) *Wireless operator* means a person employed in the operating of all sorts of apparatus for wireless telecommunication.

(c) *Ministry* means the Ministry of Iceland.

(d) *Wireless apparatus* means apparatus used for transmission and reception of intelligence between distant points, without any intervening conductor.

I.—ERECTION OF WIRELESS STATIONS.

II.

On Icelandic soil, or within the territorial waters of Iceland, or on ships registered in Iceland, a wireless station must not be erected or worked without a special permit of the Ministry, who will issue a licence for such station. This licence, or a certified copy of it, must always be kept at the station named therein. If the stipulations contained in this licence are not complied with, it may be withdrawn and the station dismantled.

III.

Application for a licence to erect and work a wireless station must be sent to the Director-General of Telegraphs.

The installation of wireless stations on board ships must comply with the stipulations of Paragraph VII of the International Regulations on Wireless Telegraphy.

A wireless station must not be opened for correspondence before the Director-General of Telegraphs has declared the equipment complies with the stipulations contained in the licence.

2.—INSTALLATION AND OPERATION OF PRIVATE SHIP STATIONS.

IV.

The wireless apparatus of a ship station must always be maintained in strict accordance with the stipulations of the licence.

V.

The Director-General of Telegraphs fixes the hours of service for each coast station.

Ship stations are, as regards hours of service, divided into three classes:

1. Stations permanently open.
2. Stations with limited hours of service.
3. Stations with no fixed hours of service.

During navigation a constant aural watch must be kept at stations of the first class. On stations of the second class watch must be kept during the hours of service, and also during the first ten minutes of each hour. At stations belonging to the third class no regular watch need be kept.

VI.

All ship stations must be so equipped as to permit both transmission and reception with 300 and 600 metre wavelengths; 600 metres is the normal wavelength of all ship stations.

An exception to this rule may be made in the case of small vessels, where it is difficult to produce a wavelength of 600 metres, when permission may be given to use 300 metre wavelengths for transmission, but every station must be able to receive wavelengths of 600 metres.

First and second-class ship stations must be fitted with an auxiliary transmitting set provided with an independent power supply, able to work for at least six hours continuously. This set must be fixed in as safe a position as possible, and must have a minimum range of eighty miles for first-class stations and fifty miles for second-class stations.

On ships where the main installation is such as to fulfil the conditions laid down for the auxiliary set, the latter is not required.

VII.

Ship stations should be operated by either one or two wireless operators licensed by the Director-General of Telegraphs.

Wireless operators holding certificates issued by foreign administrations may be permitted to operate ship stations, but a separate permit must be obtained for each voyage.

The certificate states:—

(a) That the holder understands the wireless apparatus and how to operate it.

(b) That the holder is able both to transmit and to receive Morse signals at a speed of not less than

(1) Twenty words a minute in the case of first-grade operators, and

(2) Twelve words a minute in the case of second-grade operators.

(c) That the holder possesses an adequate knowledge of the Regulations affecting wireless telegraphy.

Furthermore, the certificate contains the holder's pledge of secrecy, whereby he is subject to the same law as telegraph operators of the telegraph administration, and the same penalties for violation.

Second-grade wireless operators are permitted to operate ship stations which are only for the ship's own use or that of the crew. Furthermore, they are entitled to operate other stations having at least one first-grade operator.

First-class ship stations are bound to be operated by at least two first-grade wireless operators.

Wireless operator's certificates must always be kept in the wireless cabin, where they can be seen by the radio inspectors of the telegraph department.

VIII.

So far as it is possible all ship stations are bound to exchange traffic with other stations, without regard to the wireless telegraph system of the station concerned. The exchange of traffic between ships must be so arranged as to interfere as little as possible with that of the coast stations, which are generally given priority in public correspondence.

As a general rule, the working of every station must be so arranged as to cause the least possible disturbance in the traffic of other stations. All unnecessary transmission of signs or words is strictly forbidden. Experiments and tests are only permitted in so far as they do not interfere with other stations. In such cases as little transmitting energy as possible and none of the ordinary wavelengths should be used.

In an Icelandic port the wireless apparatus of a ship must not be made use of except in case of:—

(a) The ship being in distress.

(b) The ship being in communication with a ship in distress.

(c) The ship being in a port where there is no telegraph or telephone station.

(d) The ship being, from some reason or other, unable to communicate with the shore otherwise than by wireless.

As regards (c) and (d) the permission of the nearest shore station within the ship's range must be obtained.

IX.

Whenever it is considered necessary, the telegraph department arranges an inspection of each ship's station by persons appointed therefore by the Director-General of Telegraphs. All their orders and arrangements relating to

the maintenance and operation of the wireless apparatus must be closely followed. Inspectors are required to supply the Director-General with a report of the inspection of each station.

3.—HANDLING OF RADIOTELEGRAMS.

X.

All wireless stations, except those intended for a special limited correspondence (see Paragraph XI), are required to accept public correspondence.

Messages are divided into three classes:—

1. Government messages.
2. Service messages.
3. Public correspondence.

The handling of these messages on the land lines will be in accordance with the domestic and international regulations governing the telegraph service. The handling of radiotelegrams between wireless stations will be carried out in accordance with Paragraphs XIV-XV, XIX-XL, XLV-XLIX of the International Wireless Telegraph Regulations.

XI.

Ship stations may be utilised for:—

- (a) General public correspondence.
- (b) Limited public correspondence—e.g., light ships, cable ships, etc.
- (c) Private correspondence (with special ships and fishing companies).

In general public correspondence the following special radiotelegrams may be accepted:—

1. Telegrams with reply prepaid.
2. Telegrams to be collected.
3. Telegrams to be delivered by mail.
4. Telegrams to be delivered by express.
5. Telegrams with certificate of delivery.

This certificate is only issued as regards delivery from the wire to the nearest wireless station.

6. Paid service messages.
7. Express telegrams. These are, however, only transmitted as such along the ordinary land lines.

All stations are bound to give precedence to inquiries from ships in distress.

Ship stations have no responsibility as regards the exchange of radiotelegrams.

Ship stations that are open for general public correspondence will, against payment, be supplied with all printed forms, journals, etc., by the telegraph department; these stations are bound to be governed by all instructions of the Director-General of Telegraphs, as regards operation of the apparatus and handling of the traffic.

XII.

The complete charge for a radiotelegram includes:—

1. The wireless charges:—
 - (a) The shore fees (belonging to the shore station).
 - (b) The ship fees (belonging to the ship station).
 - (c) The transit fees (belonging to an intermediate land or ship station that may be required to handle the message).
2. The wire charges.

The shore charges in this country shall be 40 cents a word, and not less than 4 frs. for each message.

The ship fees are fixed by the shipowner with the approval of the Director-General. They must not exceed 40 cents, and the minimum charges must not be more than that for a ten-words message. Service

messages *re* wireless traffic, that has only passed between wireless stations, are not free of charge on the land lines. Press telegrams at half rate are not accepted.

XIII.

The entire charge for handling a radiotelegram from sender to addressee is to be charged to the sender. It is not permitted to charge more than stated in the tariff books.

XIV.

Every shipowner is liable for all charges collected on board his ships.

XV.

Each ship station is bound to send, once monthly, all original radiotelegrams, with relative vouchers, to the Director-General of Telegraphs.

XVI.

Reimbursement of charges, and accounts with the Telegraph Department, are to be governed by the Paragraphs XLI and XLIII of the International Radiotelegraph Service Regulations.

4.—EXPERIMENTAL AND AMATEUR STATIONS.

XVII.

Those wishing to erect an experimental or amateur wireless station must send an application for permission therefor to the Director-General of Telegraphs.

The applicant must prove his ability to transmit and receive at not less than ten words a minute in the Continental Morse code, and that he possesses an elementary knowledge of the science of wireless telegraphy. The application must be accompanied by drawings, and an accurate specification of the station to be erected. Such stations will not be permitted to radiate waves of greater length than 200 metres.

In the event of a licence being granted to such stations the licensee must sign a declaration of secrecy.

5.—OTHER STIPULATIONS.

XVIII.

The stipulations of Paragraph VIII, *re* use of wireless apparatus in ports, are also valid as regards foreign vessels.

XIX.

The Ministry may prohibit all radiotelegraphic communication within the territorial waters of Iceland, by both Icelandic and foreign vessels, and may make the necessary arrangements to enforce this prohibition.

The Ministry can, furthermore, exercise a censorship over all such radiotelegraphic traffic, and stop any radiotelegram that is considered to be harmful to the safety of the State.

XX.

Violations of these Regulations are liable to a fine not exceeding 10,000 krónur, or imprisonment for a term not exceeding six months, if the transgression does not involve a more severe punishment. Illegally erected or operated wireless apparatus will be confiscated.

Lawsuits arising from the violation of these Regulations will be tried in public police courts.

XXI.

These Regulations shall come into force immediately.

Date of Issue: May 17th, 1918.

INDIA

GREAT BRITAIN'S connection with India followed on that of the Portuguese, Dutch, and French in the fifteenth, sixteenth, and seventeenth centuries respectively. The London East India Company, formed to concentrate in a single corporation the isolated British trading efforts in the Far East, was incorporated under Royal Charter by Queen Elizabeth on December 31st, 1600.

The famous Indian mutiny of 1857 brought a realisation of the fact that a commercial company is not suited for administering an Empire, and in 1858 Queen Victoria assumed "the Government of the territories in India." In 1877 the British Queen adopted the title of "Empress of India," and at present the name "British India" covers all territories governed by the King-Emperor through the Viceroy of India, or through any officer subordinate to him; whilst "India" means "British India," together with any territories of any native prince or chief under the suzerainty of His Majesty, exercised through the Governor-General of India or any officer subordinate to him (Act 52 & 53 Vict., C. 63, S. 18).

Continental India (including Baluchistan) stretches between 8° 0' and 37° 0' N. latitude, and lies in 61° 0' to 101° 0' E. longitude. Delhi, the new capital, is in 77° 0' E. longitude. The total area covers 1,803,000 square miles, with a population of over 315,000,000; in other words, it includes a territory larger than the continent of Europe, exclusive of Russia.

CONTROL.

The control of radiotelegraphy in India is vested in the Director-General of Posts and Telegraphs, advised by the Indian Wireless Telegraph Board, constituted in 1920 for the purpose of co-ordinating military and civil wireless telegraphic and telephonic requirements. With the exception of portable stations employed for purely military purposes, all radio stations in India and Burma are worked and controlled by the Indian Department of Posts and Telegraphs.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
The Hon. Mr. H. N. Hutchinson	Director-General of Posts and Telegraphs ..	Simla
Lieut.-Col. Adrian Simpson, C.M.G., late R.E.	Director of Wireless Telegraphs	Simla
Captain P. J. Edmunds	Officer-in-Charge, Karachi Wireless Division	Karachi
Mr. N. H. Swinstead	Controller of Wireless Traffic	Simla
Captain R. N. Hawes	Superintendent of Wireless Instruction ..	Karachi

ORGANISATION.

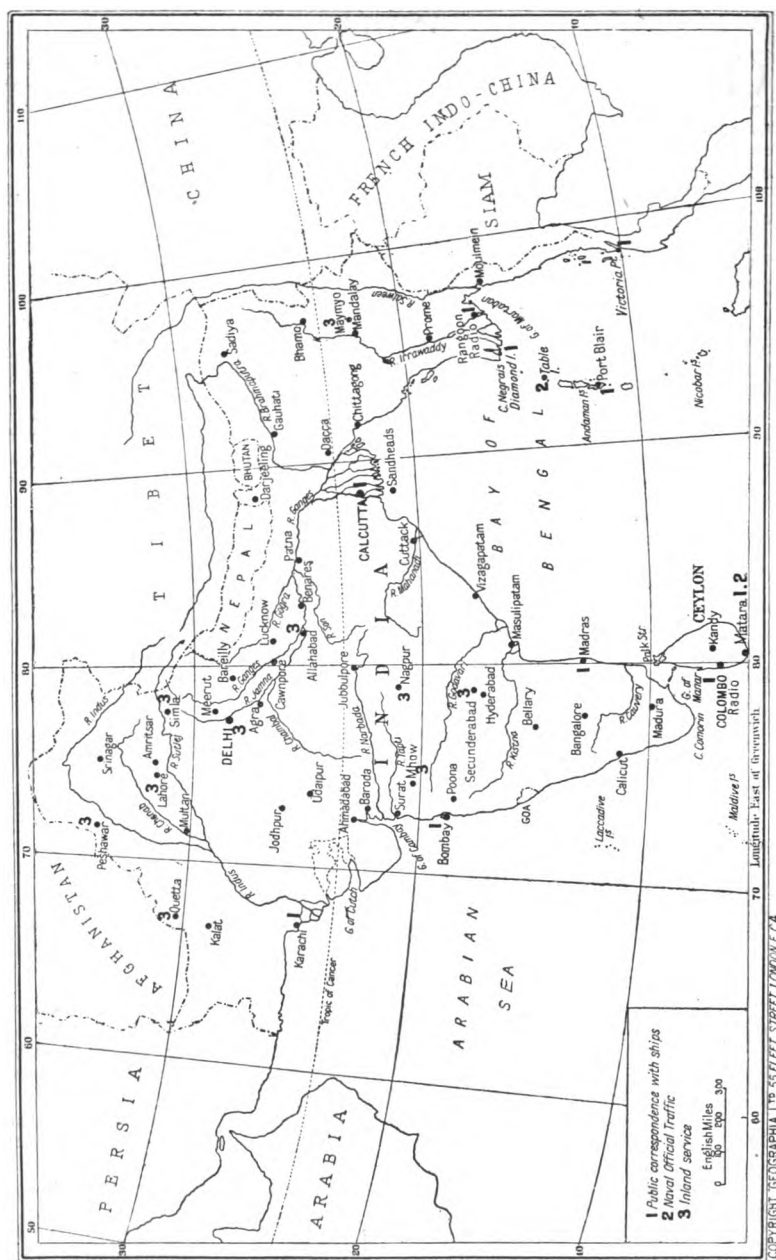
The first stations opened for traffic in India were three 2 kw. Lodge-Muirhead stations at Diamond Island, Table Island, and Port Blair, erected for the maintenance of communication with the Andaman Islands. These date from March, 1905. All existing Wireless Telegraph stations in India form part of the Indian Telegraph network of the country.

A scheme is under consideration by the Government of India for the establishment of a High-speed Commercial Wireless Circuit between Madras and Rangoon.

There are no *privately owned* stations, nor are there any Wireless Clubs or Societies.

ADMINISTRATION.

The administration of radiotelegraphy in India is at present governed by the Indian Telegraph Act, XIII, of 1885, as modified up to June 1st, 1910.



This is further extended by (1) the Indian Telegraph (Amendment) Act, VII, of 1914, by (2) the Indian Post Office and Telegraph (Amendment) Act, XIV, of 1914, and by (3) the Indian Wireless Telegraph (Ships) Rules, 1915.

We append rules relating to the granting of experimental licences to military officers.

At present no licences to work wireless telegraphy are issued, and no experiments by private individuals are permitted.

The following Laws and Regulations affecting radiotelegraphy in India are printed in our pages, but the present Act and Rules are under revision by the Government of India.

A—Abstract of the Indian Telegraph Act, No. XIII, of 1885, as modified up to June 1st, 1910.

B—The Indian Telegraph (Amendment) Act. No. VII, of 1914.

C—The Indian Post Office and Telegraph (Amendment) Act, No. XIV, of 1914.

D—The Indian Wireless Telegraph (Ships) Rules, 1915.

E—First Schedule.

F—Second Schedule.

G—Regulations Governing Experimental Licences.

TELEGRAPH ACT XII, OF 1885.

(Modified up to June 1st, 1910.)

A Part I. deals with former Acts which are hereby repealed, and with definitions of terms used in the present Act.

Part II. reads as follows:—

PART II.

PRIVILEGES AND POWERS OF THE GOVERNMENT.

4. Within British India, the Governor-General in Council shall have the exclusive privilege of establishing, maintaining and working telegraphs:

Provided that the Governor-General in Council may grant a licence, on such conditions* and in consideration of such payments as he thinks fit, to any person to establish, maintain or work a telegraph within any part of British India.

5. (1) On the occurrence of any public emergency, or in the interest of the public safety, the Governor-General in Council or a Local Government, or any officer specially authorised in this behalf by the Governor-General in Council, may—

(a) take temporary possession of any telegraph established, maintained or worked by any person licensed under this Act; or

(b) order that any message or class of messages to or from any person or class of persons or relating to any particular subject, brought for transmission by, or transmitted or received by, any telegraph, shall not be transmitted, or shall be intercepted or detained, or shall be disclosed to the Government or an officer thereof mentioned in the order.

(2) If any doubt arises as to the existence of a public emergency, or whether any act done under sub-section (1) was in the interest of the public safety, a certificate signed by a Secretary to the Government of India or to

the Local Government shall be conclusive proof on the point.

6. Any railway company, on being required so to do by the Governor-General in Council, shall permit the Government to establish and maintain a telegraph upon any part of the land of the company, and shall give every reasonable facility for working the same.

7. (1) The Governor-General in Council may, from time to time, by notification in the *Gazette* of India, make rules consistent with this Act for the conduct of all or any telegraphs established, maintained or worked by the Government or by persons licensed under this Act.

(2) Rules under this section may provide for all or any of the following, among other matters, that is to say:—

(a) the rates at which, and the other conditions and restrictions subject to which, messages shall be transmitted;

(b) the precautions to be taken for preventing the improper interception or disclosure of messages;

(c) the period for which, and the conditions subject to which, telegrams and other documents belonging to, or being in the custody of, telegraph officers shall be preserved; and

(d) the fees to be charged for searching for telegrams or other documents in the custody of any telegraph officer.

(3) When making rules for the conduct of any telegraph established, maintained or worked by any person licensed under this Act, the Governor-General in Council may, by the rules, prescribe fines for any breach of the same:

Provided that the fines so prescribed shall not exceed the following limits, namely:—

(i) when the person licensed under this Act is punishable for the breach, one thousand rupees, and in the case of a continuing breach a further fine of two hundred rupees for every day after the first during the whole or any part of which the breach continues;

(ii) when a servant of the person so licensed, or any other person, is punishable

* For rules as to grant of telephone exchanges and telegram subscription rules in connection with such exchanges, see *Genl. Stat. R. & O.*, Vol. II., pp. 972 and 983.

for the breach, one-fourth of the amounts specified in clause (i).

8. The Governor-General in Council may, at any time, revoke any licence granted under section 4, on the breach of any of the conditions therein contained, or in default of payment of any consideration payable thereunder.

9. The Secretary of State for India in Council shall not be responsible for any loss or damage which may occur in consequence of any telegraph officer failing in his duty with respect to the receipt, transmission or delivery of any message; and no such officer shall be responsible for any such loss or damage unless he causes the same negligently, maliciously or fraudulently.

Part III. deals with power to place telegraph lines and posts, and covers sections 10-18, finishing with *Paragraph 19*.

19. Every telegraph line or post placed before the passing of this Act under, over, along, across, in or upon any property, for the purposes of a telegraph established or maintained by the Government, shall be deemed to have been placed in exercise of the powers conferred by, and after observance of all the requirements of, this Act.

Part IV. deals with penalties under the Act, and contains Paragraphs 20, 21, 22, 23, and 24; passing on to *Paragraph 25*.

25. If any person, intending—

- (a) to prevent or obstruct the transmission or delivery of any message, or
- (b) to intercept or to acquaint himself with the contents of any message, or
- (c) to commit mischief,

damages, removes, tampers with or touches any battery, machinery, telegraph line, post, or other thing whatever, being part of or used in or about any telegraph or in the working thereof, he shall be punished with imprisonment for a term which may extend to three years, or with fine, or with both.

Paragraphs 26, 27, 28 and 29 deal with offences connected with controversion of official secrecy and misconduct on the part of officials. This Part IV. concludes with *Paragraphs 30-32*.

30. If any person fraudulently retains or wilfully secretes, makes away with or detains a message which ought to have been delivered to some other person, or, being required by a telegraph officer to deliver up any such message, neglects or refuses to do so, he shall be punished with imprisonment for a term which may extend to two years or with fine, or with both.

31. A telegraph officer shall be deemed a public servant within the meaning of sections 161, 162, 163, 164 and 165 of the Indian Penal Code; and in the definition of "legal remuneration" contained in the said section 161, the word "Government" shall, for the purposes of this Act, be deemed to include a person licensed under this Act.

32. Whoever attempts to commit any offence punishable under this Act shall be punished with the punishment herein provided for the offence.

Part V. contains supplemental provisions covering charges for damage made against Local Governments and contains Paragraphs 33 and 34 of the Act.

* Genl. Acts, Vol. I.

ACT No. VII. OF 1914.

PASSED BY THE GOVERNOR-GENERAL OF INDIA IN COUNCIL.

(Received the assent of the Governor-General on the 28th February, 1914.)

An Act further to amend the Indian Telegraph Act, 1885.

B Whereas it is expedient further to amend the Indian Telegraph Act 1885; It is hereby enacted as follows:—

1. This Act may be called the Indian Telegraph (Amendment) Act, 1914.

2. For sub-section (2) of section 1 of the Indian Telegraph Act, 1885 (hereinafter called the said Act), the following shall be substituted, namely:—

"(2) It extends to the whole of British India, including the Sonthal Parganas and the Pargana of Spiti, and it applies also to—

- (a) all native Indian subjects of His Majesty in any place without and beyond British India;
- (b) all other British subjects within the territories of any Native State in India; and
- (c) all servants of the King, whether British subjects or not, within the territories of any Native State of India."

3. In clause (1) of section 3 of the said Act for the words "transmitting or making," the words "making, transmitting or receiving" shall be substituted.

4. Section 4 of the said Act shall be re-numbered 4 (1) and after the said sub-section the following proviso and sub-section shall be added, namely:—

"Provided further that the Governor-General in Council may, by rules made under this Act and published in the *Gazette* of India, permit, subject to such restrictions and conditions as he thinks fit, the establishment, maintenance and working—

(a) of wireless telegraphs on ships within Indian territorial waters, and

(b) of telegraphs other than wireless telegraphs within any part of British India.

"(2) The Governor-General in Council may, by notification in the *Gazette* of India, delegate to the telegraph authority all or any of his powers under the first proviso to sub-section (1).

"The exercise by the telegraph authority of any power so delegated shall be subject to such restrictions and conditions as the Governor-General in Council may, by the notification, think fit to impose."

5. After section 19 of the said Act the following sections shall be inserted, namely:—

"19A. (1) Any person desiring to deal in the legal exercise of a right with any property in such a manner as is likely to cause damage to a telegraph line or post which has been duly placed in accordance with the provisions of this Act, or to interrupt or interfere with telegraphic communication, shall give not less than one month's notice in writing of the intended exercise of such right to the telegraph authority, or to any telegraph officer whom the telegraph authority may empower in this behalf.

"(2) If any such person without having complied with the provisions of sub-section (1) deals with any property in such a manner as is likely to cause damage to any telegraph line or post, or to interrupt or interfere with telegraphic communication, a Magistrate of the first or second class may, on the application of the telegraph authority, order such person

to abstain from dealing with such property in such manner for a period not exceeding one month from the date of his order and forthwith to take such action with regard to such property as may be in the opinion of the Magistrate necessary to remedy or prevent such damage, interruption or interference during such period.

"(3) A person dealing with any property in the manner referred to in sub-section (1) with the *bona fide* intention of averting imminent danger of personal injury to himself or any other human being shall be deemed to have complied with the provisions of the said sub-section if he gives such notice of the intended exercise of the right as is in the circumstances possible, or where no such previous notice can be given without incurring the imminent danger referred to above, if he forthwith gives notice of the actual exercise of such right to the authority or officer specified in the said sub-section.

"198. The Governor-General in Council may, by notification in the *Gazette* of India, confer upon any licensee under section 4, in respect of the extent of his licence and subject to any conditions and restrictions which the Governor-General in Council may think fit to impose and to the provisions of this Part, all or any of the powers which the telegraph authority possesses under this Part with regard to a telegraph established or maintained by the Government or to be so established or maintained:

"Provided that the notice prescribed in section 19A shall always be given to the telegraph authority or officer empowered to receive notice under section 19A (1)."

6. For section 20 of the said Act the following section shall be substituted, namely:—

"20. (1) If any person establishes, maintains or works a telegraph within British India in contravention of the provisions of section 4 or otherwise than as permitted by rules made under that section, he shall be punished, if the telegraph is a wireless telegraph, with imprisonment which may extend to three years, or with fine, or with both, and, in any other case, with a fine which may extend to one thousand rupees.

"(2) Notwithstanding anything contained in the Code of Criminal Procedure, 1898, offences under this section in respect of a wireless telegraph shall, for the purposes of the said Code, be bailable and noncognisable.

"(3) When any person is convicted of an offence punishable under this section, the Court before which he is convicted may direct that the telegraph in respect of which the offence has been committed, or any part of such telegraph, be forfeited to His Majesty."

7. After section 20 of the said Act the following section shall be inserted—namely:

"20A. If the holder of a licence granted under section 4 contravenes any condition contained in his licence, he shall be punished with fine which may extend to one thousand rupees, and with a further fine which may extend to five hundred rupees for every week during which the breach of the condition continues."

8. After section 25 of the said Act the following section shall be inserted—namely:

"25A. If, in any case not provided for by section 25, any person deals with any property and thereby wilfully or negligently damages any telegraph line or post duly placed on such property in accordance with the provisions of this Act, he shall be liable to pay the telegraph authority such expenses (if any) as may

be incurred in making good such damage, and shall also, if the telegraphic communication is by reason of the damage so caused interrupted, be punishable with a fine which may extend to one thousand rupees:

"Provided that the provisions of this section shall not apply where such damage or interruption is caused by a person dealing with any property in the legal exercise of a right if he has complied with the provisions of section 19A (1)."

9. After section 29 of the said Act the following section shall be inserted—namely:

"29A. If any person, without due authority, (a) makes or issues any document of a nature reasonably calculated to cause it to be believed that the document has been issued by, or under the authority of, the Director-General of Telegraphs, or

(b) makes on any document any mark in imitation of, or similar to, or purporting to be, any stamp or mark of any Telegraph Office under the Director-General of Telegraphs, or a mark of a nature reasonably calculated to cause it to be believed that the document so marked has been issued by, or under the authority of, the Director-General of Telegraphs

he shall be punished with fine which may extend to fifty rupees."

10. In section 34 (1) of the said Act after the figures and word "18 sub-section (1)," the words, figures and letter "and section 19A sub-section (2)," shall be inserted.

ACT No. XIV. OF 1914.

PASSED BY THE GOVERNOR - GENERAL OF INDIA IN COUNCIL.

(Received the assent of the Governor-General on 16th September, 1914.)

C An Act further to amend the Indian Telegraph Act, 1885, and the Indian Post Office Act, 1898.

Whereas in view of the amalgamation of the offices of Director-General of Telegraphs and of Director-General of the Post Office of India, it is expedient further to amend the Indian Telegraph Act, 1885, and the Indian Post Office Act, 1898:

It is hereby enacted as follows:

1. This Act may be called the Indian Post Office and Telegraph (Amendment) Act, 1914.

2. In clause (6) of section 3 and in section 29A of the Indian Telegraph Act, 1885, for the word "Telegraphs," wherever it occurs the words "Posts and Telegraphs" shall be substituted.

3. In section 2 of the Indian Post Office Act, 1898—

(i.) in clause (a) for the words "the Post Office of India," the words "Posts and Telegraphs" shall be substituted; and

(ii.) in clause (b), after the word "department," the words "established for the purpose of carrying the provisions of the Act into effect and" shall be inserted.

INDIAN WIRELESS TELEGRAPH (SHIPS) RULES, 1915.

DATED DELHI, FEBRUARY 24TH, 1917.

D In exercise of the powers conferred by section 4 of the Indian Telegraph Act, 1885 (XIII of 1885), as amended by the Indian Telegraph (Amendment) Act, 1914, (VII of 1914), the Governor-General in Council is pleased to make the following rules

regulating the establishment, maintenance and working of wireless telegraphs on ships within Indian territorial waters:

1. These rules may be called the Indian Wireless Telegraph (Ships) Rules, 1915.

2. In these rules, unless there is anything repugnant in the subject or context—

“Convention” means the International Radiotelegraph Convention concluded at London on July 5th, 1912.

“Director-General” means the Director-General of Posts and Telegraphs, India.

“Harbour” includes harbours whether natural or artificial, estuaries, navigable rivers, piers, jetties, and other works in or at which ships can obtain shelter, or ship and unship goods or passengers.

“Licence” means a licence granted under these rules.

“Service Regulations” means the service regulations annexed to the Convention.

3. Except by general or special permission in writing from the Director-General or an officer authorised by him in this behalf, no person shall work or use a wireless telegraph on board any ship (other than a ship of war) whilst the ship is in any harbour in India.

4. No person shall send any message by means of the wireless telegraph on board any ship (other than a ship of war), whilst the ship is within Indian territorial waters, when and where such message can be forwarded by a Government telegraph either with or without wires.

5. When communications are made by means of wireless telegraph between any ship within Indian territorial waters and a wireless telegraph station on land, the rules in force for the working of wireless telegraph at that station as given in the Handbook, General Rules, and Departmental Instructions for Radiotelegraph stations, shall be observed.

6. No person shall work the wireless telegraph on board any ship within Indian territorial waters in such a way as to interrupt or interfere with—

(a) Naval or military signalling; or

(b) the transmission of messages between other wireless telegraph stations.

Explanation.—In this rule Naval or Military signalling includes signalling or communicating by means of any system of wireless telegraphy, by His Majesty's Imperial, Colonial, or Indian Naval or Military Forces.

7. The Director-General or any officer authorised by him in this behalf may demand to be shown the licence or copy of such licence issued to any ship authorising the use of any wireless telegraph on board the ship or the certificate issued to the operator on the ship, and every person having the licence or certificate in his possession or under his control shall comply with such demand.

8. No wireless telegraph shall be established or worked on any ship registered in British India except under licence granted by the Director-General on behalf of the Governor-General in Council in the form in the First Schedule to these rules and subject to the terms and conditions set forth in that form.

9. The Director-General shall not grant a licence unless he is satisfied that—

(a) the wireless telegraph can be worked in accordance with the provisions of the Convention and the Service Regulations, and

(b) operators qualified in accordance with Rule 12 will be employed to work the same.

10. A licence may include any number of ships belonging to the same person.

11. (1) The Director-General may grant to the holder of a licence a supplementary licence in respect of any ship belonging to him and not included in the original licence.

(2) A supplementary licence shall be in such form as the Director-General thinks fit, and shall be deemed to be incorporated with the original licence, and the original licence shall apply to each ship included in the supplementary licence to the same extent as if the ship had been included in the original licence.

12. No person shall work a wireless telegraph on board any ship registered in British India unless he is of British nationality and holds either a first or a second-class certificate of competency granted by, or under the authority of, the Director-General or a certificate (issued by the authority empowered to grant such certificates) entitling the holder to be employed as a wireless telegraph operator on board ships registered in the United Kingdom or in a British Possession or Protectorate.

13. (1) The Director-General may grant certificates of competency in accordance with the conditions contained in the Second Schedule to these rules.

(2) Should the holder of a certificate of competency granted under these rules be proved to the satisfaction of the Director-General wilfully or negligently to have failed to comply with the provisions of the Convention or the Service Regulations, or any other regulations which may be issued from time to time for his guidance, the Director-General may endorse, suspend or cancel the certificate.

(3) The Director-General or any officer authorised by him in this behalf may require the holder of a certificate of competency to produce the same for endorsement under sub-rule (2), and the holder shall comply with such requisition.

14. Nothing in these rules shall apply to the use of a wireless telegraph for the purpose of making or answering signals of distress.

THE FIRST SCHEDULE.

(See Rule 8.)

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.

En in these presents (and in the Table annexed hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say):

The expression “The Director-General of Posts and Telegraphs” means the Director-General of Posts and Telegraphs, India, for the time being.

The expression “the Telegraph Act” means the Indian Telegraph Act, 1885 (XIII of 1885).

The word “telegraph” has the same meaning as in the Telegraph Act.

The expression “the Rules” means the Rules made from time to time under the Telegraph Act.

The expression “Naval signalling” means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval station and

any other wireless telegraph station whether a coast station or a ship station.

The expressions "the International Telegraph Convention" and "the International Telegraph Regulations" mean respectively the International Convention of St. Petersburg dated 10th-22nd July, 1875, and the Service Regulations made thereunder and include respectively any modification of the said Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention, 1912" means the International Radiotelegraph Convention signed at London on the 5th day of July, 1912, and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The expression "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

Apparatus shall be deemed to be "syntonsed" when the transmitting apparatus is so adjusted as to communicate with a receiver which has a corresponding adjustment, and to produce as little effect as possible on a receiver not having a corresponding adjustment.

Whereas hereinafter called "the licensee" is desirous of establishing, maintaining and working on the ships belonging to the licensee, specified in the Table annexed hereto, wireless telegraphy under section 4 of the Indian Telegraph Act, 1885 (XIII of 1885):

And whereas by reason of the provisions of the said Telegraph Act it is unlawful to establish, maintain or work any apparatus for wireless telegraphy on board any ship registered in British India except under and in accordance with rules made in that behalf by the Governor-General of India in Council:

And whereas the licensee has requested the Governor-General in Council to grant to the licensee the licences, powers, and authorities hereinafter expressed and contained for the period, upon the terms and subject to the stipulations and conditions hereinafter appearing;

Now the Governor-General in Council in exercise of all powers and authorities enabling him in this behalf hereby grants to the licensee during the term or period commencing on the day of the date hereof, and terminating on the 31st day of December, 19 , licence and permission—

(1.) To establish, maintain and work for the purposes hereinafter mentioned at the ship stations specified in the Table annexed hereto and at such other ship stations as may be specified in any Supplemental licence given from time to time under the hand of the Director-General of Posts and Telegraphs, but subject in all respects to the Rules, apparatus for wireless telegraphy of the kind used in the system known as the system of wireless telegraphy.

Provided that—

(a) the apparatus installed at each ship station shall be of the character specified in the said Table opposite to the name of such station or in any such supplemental licence as aforesaid;

(b) the apparatus used at all of the said ship stations shall be syntonsed;

(c) the licensed apparatus shall be so constructed as to be capable of using wavelengths of 300 and 600 metres in length as measured by the standard of measurement in use for the time being by the Government of India and such other wavelengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Director - General of Posts and Telegraphs;

Provided that only wavelengths of 600 metres shall be used by the licensee during the period of any war in which the United Kingdom is engaged;

(d) the apparatus shall admit of the transmission and reception of messages at the rate of not less than twenty words a minute, five letters being counted as one word;

(ii.) to transmit and receive messages by means of the licensed apparatus between the said ship stations and between the said ship stations and coast stations and other ship stations. Provided that the transmission and receipt of messages from and at the said ship stations when in any harbour in India shall be subject to such conditions and restrictions as the Governor-General in Council may prescribe from time to time; and

(iii.) to receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus;

And it is hereby declared that the said licence and permission is granted on and subject to the following further conditions and provisions:—

1. The licensed apparatus shall not be used by the licensee or by any other person either on behalf or by permission of the licensee for the transmission or receipt of messages except messages authorised by this licence.

2. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Governor-General in Council is of opinion that the working of the licensed apparatus at any ship station specified in the Table annexed hereto or in any such Supplemental Licence as aforesaid is inconsistent with the free use of Naval signalling the licensee shall, when required in writing by the Director - General of Posts and Telegraphs so to do, close the said station; the making of such a requisition shall be conclusive evidence of the opinion of the Governor-General in Council to the effect aforesaid.

(3) These provisions for the protection of Naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

3. For the purpose of this licence the licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

4. The licensee shall observe the provisions of the Radiotelegraph Convention, 1912.

5. The licensee shall comply with all such directions and observe all such rules and regulations as may be given or made by the Director - General of Posts and Telegraphs

from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

6. The licensee apparatus shall not, without the consent of the Director-General of Posts and Telegraphs, be altered or modified in respect of any of the particulars mentioned in the Table annexed hereto or in any such Supplemental Licence as aforesaid.

7. The licensee shall at all times indemnify the Governor-General in Council against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

8. (1) Subject to the provisions of this licence and of the Rules the licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or precedence whether as regards rates of charge order of transmission or otherwise.

(2) In respect of the messages transmitted on behalf of His Majesty's Government the licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

9. The licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

10. The licensed apparatus at the said ship stations shall be worked only by a person or persons holding a certificate or certificates of competency issued by the Director-General of Posts and Telegraphs or by the proper authority in the United Kingdom, or in any British Possession or Protectorate.

11. The licensee shall not divulge to any person (other than properly authorised officials of the Government of India or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and transmitted by Naval signalling or by any system of wireless telegraphy provided or maintained by or for the purposes of the different Departments of the Government of India, or by any other licensee of the Government of India.

12. (1) The licensee shall keep full accounts, records and registers of all messages transmitted by means of the licensed apparatus, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Director-General of Posts and Telegraphs shall from time to time reasonably require to be shown, messages on the service of the Government of India being in such registers distinguished from other messages.

(2) The licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least fifteen months counting from the month following that in which the radiotelegrams were handed in as prescribed by the Radiotelegraph Convention, 1912, and in default of any provisions on the

subject in the said Convention for such period as is from time to time prescribed by the International Telegraph Regulations and such registers and message papers shall be open to the inspection of the Director-General of Posts and Telegraphs or his officers thereto authorised at the office of the licensee in between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a statute or general holiday.

13. The licensee shall render to the Director-General of Posts and Telegraphs such accounts as the Director-General shall from time to time direct in respect of all charges due or payable under the Radiotelegraph Convention, 1912, in respect of messages exchanged between the ship stations hereby licensed and coast stations and shall pay to the Director-General at such times and in such manner as he shall direct all sums which shall be due from the licensee in accordance with such accounts.

14. The Director-General of Posts and Telegraphs and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations mentioned in the said Table for the purpose of inspecting and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the method of working and user of such apparatus and telegraphic instruments, respectively.

15. The licensee shall carry on every ship mentioned in the said Table on which a ship station is established a print or copy of the licence and supplemental licence if any certified under the hand of an officer authorised for that purpose by the Director-General of Posts and Telegraphs to be a true copy and also such documents as may be prescribed by the Director-General of Posts and Telegraphs for the purpose of enabling the licensee to communicate with coast stations in accordance with the Radiotelegraph Convention, 1912.

16. Except with the consent in writing of the Governor-General in Council the licensee shall not assign, underlet or otherwise dispose of, or admit any other person or body to participate in the benefit of the licences, powers and authorities hereby granted or any of such licences, powers or authorities.

17. (1) If and whenever an emergency shall have arisen in which it is expedient for the public service that the Governor-General in Council shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the Director-General or any other officer specially authorised by him to cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of the Governor-General in Council and to be used for the service of the Government and subject thereto for such ordinary services as to the said officer may seem fit and in that event any person authorised by the said officer may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

(2) Any such officer may in such event as aforesaid instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either

wholly or partly and in such manner as he may direct and such persons may accordingly enter upon any ship on which any such apparatus is installed and assume such control or the said officer may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages, or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer may prescribe and the licensee shall obey and conform to all such directions.

(3) The licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

18. The Governor-General in Council may at any time by notice in writing but without assigning any reason revoke and determine these presents and the licences, powers and authorities hereinbefore granted and each and every of them as to all or any of the ship stations hereby licensed and thereupon these presents and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void as to all or any of the said ship stations (as the case may be) but without prejudice to any right of action or remedy which shall have accrued or shall thereafter accrue to the Government of India under any condition or provision herein contained.

19. Nothing in these presents contained shall prejudice or affect the right of the Governor-General in Council, from time to time, to establish, extend, maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit; neither shall anything herein contained prejudice or affect the right of the Governor-General in Council from time to time and at any time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of British India or Indian Waters by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Governor-General in Council by or under the Telegraph Act.

20. Any notice, request or consent (whether required to be in writing or not) to be given by or on behalf of the Governor-General in Council under these presents may be under the hand of the Director-General of Posts and Telegraphs and may be served by sending the same in a registered letter addressed to the licensee at the office for the time being of the licensee, or if such notice, request or consent relates to any particular ship station, by delivery to the master of the ship upon which such station is installed; and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Director-General of Posts and Telegraphs.

Signed, sealed and delivered by Director-General of Posts and Telegraphs for and in the name and as the act and deed of the Governor-General in Council in the presence of

Other particulars :—

THE SECOND SCHEDULE.

(See Rule 13.)

F CONDITIONS FOR THE GRANTING OF CERTIFICATES OF COMPETENCY AS WIRELESS TELEGRAPH OPERATOR ON BOARD SHIPS, REGISTERED IN BRITISH INDIA.

1. Certificates of competency as wireless telegraph operator on board ships registered in British India shall be granted by the Director-General subject to an examination, shall be issued in Form B annexed hereto, shall indicate the system or systems of radiotelegraphy in which the holder's examination was conducted, and shall certify that the holder—

(a) in the case of first-class certificates, is able to send and receive, by sound, messages in plain language in the International Morse Code at a rate of not less than 20 words per minute (five letters being counted as one word); or

(b) in the case of second-class certificates is able to send and receive, by sound, messages in plain language in the International Morse Code at a rate of from 12 to 19 words per minute (five letters being counted as one word); and

(c) is able to adjust the apparatus ordinarily used in some well-known system of wireless telegraphy so as to suit the varying conditions of working, without using excessive transmitting power; and

(d) has an efficient working knowledge of the regulations applicable to the exchange of radiotelegraphic traffic.

2. (1) Candidates at an examination will be expected—

(a) to send on an ordinary Morse Key for five consecutive minutes at not less than the prescribed speed. The accuracy of signalling, the correct formation of the letters, and the correctness of spacing shall be taken into account;

(b) to receive and write legibly at the prescribed speed from a double headgear telephone receiver as ordinarily used for radiotelegraphic reception;

(c) to understand simple diagrams of the electrical connections of the apparatus used in the system in which he is being examined;

(d) to be able to connect up the apparatus with the help of such diagrams so far as this is required in the system in which he is being examined;

(e) to name the principal parts of the apparatus and indicate their use;

(f) to mention the most common faults, and the means usually taken to remedy them in the system in which he is being examined;

(g) to explain the steps taken to change from one wavelength to another, in sending and receiving, in the system in which he is being examined.

TABLE OF LICENSED SHIP STATIONS.

[illegible]

(2) The practical examination shall embrace the following :—

- (a) Connecting up the apparatus.
- (b) Operating (sending and receiving).
- (c) Regulating and adjusting.
- (d) Altering the wavelength.
- (e) Reducing or increasing the transmitting power.

(f) Tracing and clearing faults.

(3) The examination in regard to the actual transmission of messages shall be based upon the rules contained in the handbook published by the Director-General.

3. Candidates for examination shall fill up an application in Form A annexed hereto and submit the same to the Director-General at Calcutta. The date and place of examination shall be notified to the candidate as soon as possible after receipt of the application.

If the candidate be successful in his examination he will sign the photograph in the presence of the Examining Officer. The Examining Officer will at the same time take the age, place and date of birth and the description of the candidate from the latter's application in Form A.

The photograph will be affixed to the back of the certificate in the office of the Director-General of Posts and Telegraphs and stamped with a special date stamp overlapping photograph and certificate.

The particulars of the description of the candidate as also his age, and date and place of birth will be entered on the back of the certificate.

The certificate will then be sent to the operator by post.

The photograph and description will be checked by the Port Authorities when the operator is signing on a ship. If the operator has not already signed his name in the space provided for that purpose on the front of the certificate he will do so in the presence of the Port authorities.

4. Candidates for examination shall pay an examination fee of Rs. 5 by means of postage stamps affixed to the form of application.

5. Examinations of persons desirous of obtaining certificates of competency referred to in Condition 1 shall ordinarily be conducted at Calcutta. Special arrangements may be made, where circumstances permit, for holding

an examination at any wireless station at which suitable apparatus is provided for the purpose.

6. If the candidate satisfactorily passes the examination, he shall make a declaration that he will observe the secrecy of radiotelegrams which come to his knowledge in the course of duty.

7. In case of failure at an examination a candidate shall not ordinarily be re-examined until after the lapse of three months. An additional fee of Rs. 5 shall be payable in respect of the further examination.

REGULATIONS GOVERNING EXPERIMENTAL LICENCES.

G The Government of India have decided that the granting of licences to military officers in respect of wireless telegraph apparatus used for experimental purposes shall be regulated by the following general principles :—

(1) When an officer conducts experiments in wireless telegraphy in his official capacity at the expense of the Government no licence is required, but only executive permission, which may be given, so far as the Telegraph Department is concerned by the Director-General, Posts and Telegraphs.

(2) When an officer carries on experiments as a private individual at his own expense he must obtain a licence. If the approval of the military authorities is required to what he proposes to do, he should obtain such approval before the Director-General, Posts and Telegraphs, is approached. The licence will then be submitted by the Director-General, Posts and Telegraphs, for the sanction of the Government of India.

(3) With reference to the above, attention is drawn to the necessity for applying for licences to own and use wireless telegraph apparatus or installations, experimental or otherwise. Applications for such licences will be submitted through the Chief of the General Staff and will contain particulars regarding the apparatus, showing (a) system it is proposed to employ, (b) maximum range of signalling with applicants' own receiving apparatus, (c) power (current and voltage), (d) source of power.

ITALIAN SOMALILAND

(See ITALY)

ITALY

THE historic kingdom of Italy occupies the central position amongst the three great peninsulas of Southern Europe, and extends from 46° 40' 12" to 34° 54' 54" North latitude; its longitude stretching from 18° 30' 37" to 6° 33' 7" East. Before the war the area totalled 110,632 square miles and the seaboard of the peninsula covered 2,272 miles.

The present constitution of Italy is an expansion of the "Statuto Fondamentale del Regno," granted March 4th, 1848, by King Charles Albert to his Sardinian subjects. The executive power of the State belongs exclusively to the Sovereign, working through responsible Ministers; whilst the legislative authority rests conjointly with the King and Parliament, the latter consisting of two Chambers. King Vittorio Emanuele III, born November 11th, 1869, is a direct descendant of the Vittorio Emanuele who was declared King of Italy on March 17th, 1861, by the first Italian Parliament.

The association of Italy with wireless telegraphy has from the start been very close, and the land of his birth has in many different ways recognised what she owes to her distinguished son, Senatore Marconi.

CONTROL.

Wireless telegraph land stations in the Kingdom belong to the Government and are operated by the Ministry of the Navy (Department of Artillery and Armaments), the Ministry of Posts and Telegraphs and the Ministry of War. Each Ministry includes a special department for dealing with wireless telegraphy.

ADMINISTRATION.

The current Rules and Regulations which we print below (and which cover the Italian Colonies) may be summarised in the following List:—

- A**—Law of June 30th, 1910, No. 395.
- B**—Regulations (No. 227) of April, 1912.
- C**—Law of June 30th, 1912.
- D**—Decree No. 1587, dated November 12th, 1916.
- E**—Decree No. 2223, dated November 4th, 1919.

A The following is known as the Law of June 30th, 1910, No. 395:—

ART. 1.—The establishment and exploitation of the radiotelegraphic and radiotelephonic installations are reserved to the Government, and in general of all those for which, in the State and in the Colonies, on land and on board ship, energy is employed in order to obtain distance effects without the use of conducting wires.

The Government has the right to grant to any person, public or private scientific or training institution, the authority to establish and to exploit installations of such a nature on land and on the passenger and mercantile vessels, for which previous concession must be obtained.

The licence may be revoked upon the recommendation of the consulting Commission when the installations cause interruptions of State stations which were in operation prior to the concession, or when they do not comply with the technical conditions established in the licence.

The exploitation of the installations granted can be revoked, suspended, or taken over by

the Government in time of war or during peace whenever the Government may deem it necessary and opportune.

The Government has also the right to inspect, through its officials, those stations which are not the property of the State, in order to ascertain whether the stations are operated in accordance with the regulations.

ART. 2.—The Government administrations concerned in these services are the Ministry of Posts and Telegraphs, of War and the Admiralty; and special regulations determine the share of the respective departments in the execution of the present law.

A permanent consultative commission is constituted to give opinions upon international agreements, questions of a scientific nature, and upon doubtful points relating to the said services.

The Commission shall also decide every doubtful case which may arise of a technical character regarding the installation and exploitation of the concessions according to Art. 1.

The Commission shall be qualified to determine the power of the radiotelegraphic and



radiotelephonic apparatus and technical and economic details for their use on vessels engaged in emigration traffic when the said apparatus has been installed by the Government according to Art. 11 of the Royal Decree, March 14th, 1909, No. 130.

Questions concerning indemnity on account of the cancellation of a licence, suspension of exploitation, or redemption as per Art. 1, shall be referred to an arbitration tribunal, which shall decide, without right of appeal. This tribunal shall be composed of three members, one nominated by the Government, one by the licensee, the third by the President of the Tribunal in Rome. The Government can leave to the said Commission the selection of its own arbitrator.

Where several licensees are interested parties to a dispute, and they are unable by mutual agreement to nominate an arbitrator, each shall submit the name of an arbitrator, and the choice will be made by drawing lots in the presence of a judge of the Tribunal of Rome.

The composition of the Commission in the present article and the rules of its working have been determined in the regulations.

Art. 3.—Every infringement of Art. 1 of the present law is punishable by a fine up to £12,000 and with imprisonment up to one year, which penalties may be imposed separately and together according to the circumstances. It is in the power of the judge to add to the said penalties the confiscation of the apparatus.

During criminal proceedings the Administration can, in virtue of decree by the prefect, and at all times that in the opinion of the prefect would be in the public interest, obtain immediate possession of the installation and provide if necessary for its removal.

Any person will incur the same penalties if he should avail himself of the installation on board commercial or passenger vessel when they are at anchor in the State waters, except in case of danger or other special cases, which will be dealt with in the regulations.

Art. 4.—If any person shall cause damage or deterioration to installations, or in any other manner interrupt, or cause interruption of the service, even temporarily, he will be liable to the penalties laid down in Art. 315 of the Penal Code, except in the case of military interference with military stations for which offence the penalties stated in the military Penal Code will be imposed.

If any person should abuse the use of the distress signal of the vessels in danger, he will be subject to the same penalties.

Art. 5.—The penalties established by the present law are understood to be applicable, without prejudice to greater offences which may take down in Art. 315 of the Penal Code, except in the case of military Penal Code.

B The following regulations (No. 227) were published in April, 1912, for carrying out the Act of June 30th, 1910 (No. 395):—

SECTION I.

1. The Ministry of Posts and Telegraphs shall have under its control:—

(a) The installation and exploitation of the stations for public service and constituting the interior network of the State and of all those opened for international communication.

(b) The verifications, inspection and control of the material and working of the service

of all the land installations exploited in virtue of Government licence.

(c) The tariff regulation for communication between all land stations and ship and shore stations, also accounting.

The Minister of War shall have under his control:—

The installation and working of stations destined exclusively to the military service, including movable field stations for use in the R. Army. In time of war the management of the service (either a part or all the stations destined to the public service) can be taken over by the military administration. The Admiralty shall have under its control:—

The installation and exploitation of the ship stations of the Royal Navy, private and mercantile; the verifications, inspections and control of the materials and of the working of the service of the installations made for passenger and mercantile traffic.

SECTION 2.

2. *Permanent Consulting Radiotelegraphic Commission.*—The Permanent Consulting Commission is composed of a President not belonging to the Government Administration, two members selected amongst persons of well known ability in electric and radiotelegraphic science, a superior officer of the Royal Navy attached to the General Staff, and a superior officer attached to the office of the Chief of the General Staff of the Royal Navy.

The following are members of the Commission by right:—

(1) The Director of Posts and Telegraphs Higher Institution.

(2) The Director in Chief of the Radiotelegraphic Department of the Posts and Telegraphs.

(3) The Officer-Director of the Radiotelegraphic Department in the Army Office of Rome.

(4) The Superior Officer of the General Staff of the Royal Navy, Chief of the Department of the Submarines, Electric Material and Radiotelegraphic Service at the Admiralty.

Three members, selected amongst the three mentioned Administrations, will act as Secretaries.

3. The President, members and secretaries will be nominated by Royal Decree, proposed by common accord, by the Ministers of the Posts and Telegraphs, Admiralty, and War.

By Ministerial Decree extraordinary members, without vote, can be added temporarily, these to be selected from persons of well-known skill, proposed by the President of the Commission.

4. The Commission shall have its office at the Admiralty in Rome. The meetings of the Commission are to be convened by the President at the request of the interested Administrations.

5. The opinion of the Consulting Commission can be asked on the following subjects:—

(a) On the compilations of arrangements and special rules for the technical organisation of the radiotelegraphic and radiotelephonic service of the State, as well as for practical rules for the constitution and exploitation of the installations.

(b) On all questions of a scientific nature, and doubtful cases referring to the radiotelegraphic and radiotelephonic services.

(c) On International Conventions.

(d) On technical conditions with reference to licences of radiotelegraphic and radiotelephonic stations.

(c) The establishment, before granting the licence, of indemnity due in case the installation should be repealed, suspended, or taken over by the State according to paragraph III. Art. 1 of the law.

(f) Repeal of the licences.

(g) On the adoption of new radiotelegraphic and radiotelephonic systems, and on the application of same by the Government service, unless they should deal with interesting systems concerning the defence of the State.

The qualified Administrations may whenever they think it warranted ask the opinion of the Commission on any subject.

The Commission is entitled to avail itself for its own study of the working rooms and of the Government experimental stations, but a previous application must be lodged with the Administrations.

6. The expenses for the working of the Commission are to be divided amongst the three Administrations interested.

SECTION 3.

7. Licences for the Exploitation of Radiotelegraphy and Radiotelephony.—Licences to persons, to institutions, and to public and private Administrations for the installation of any radiotelegraphic or radiotelephonic station will be granted in virtue of an agreement containing the conditions to be observed, by a decree issued by the Ministry of the Posts and Telegraphs, acting in harmony with the Ministry of War and the Admiralty.

Such licences cannot last longer than February 16th, 1917. After this period the licence can be renewed.

8. Licences for radiotelegraphic stations for private use are limited to private correspondence between properties of the same licensee or between properties of two licensees, all correspondence with third persons being absolutely excluded. Such licences are exempted from tax when the stations are constructed on private property and work over all the territory dividing the stations, without interruption by public land.

Licensees are also exempted from taxes which are granted for installation of radiotelegraphic and radiotelephonic stations having for object a scientific or educational purpose.

9. All applications for licences for radiotelegraphic and radiotelephonic installations must contain:—

(a) The exact indication of the person or institution making the application and their legal residence.

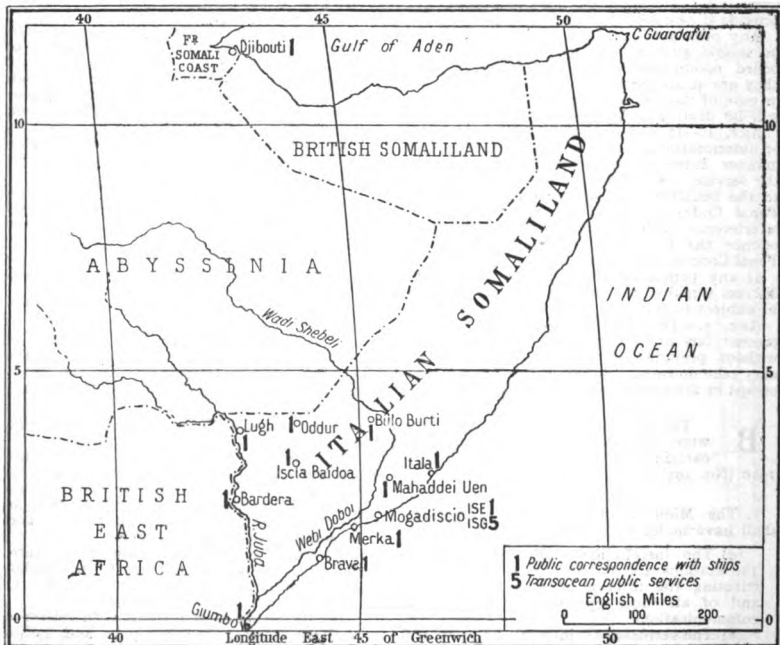
(b) The nature and purpose for the licence, the place or places where it is proposed to instal the station or stations, and their presumed zone of service.

(c) The detailed plans for the construction and technical quality of the installation, indicating in a detailed manner the nature and power thereof.

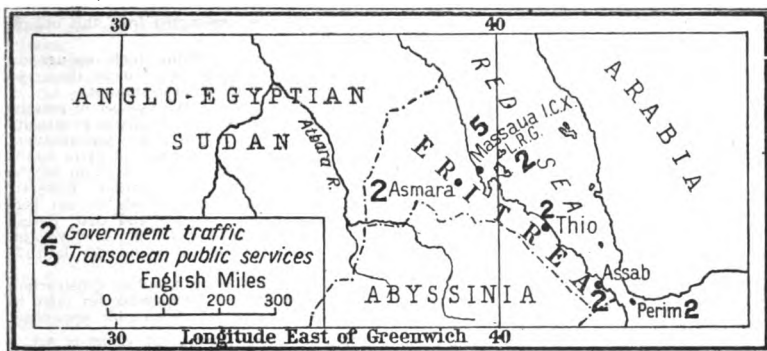
(d) The period for which the licence is asked.

(e) The period required before starting the station.

(f) The receipt of the amount to constitute the deposit-guarantee, as per Art. 13 and 14. Such a deposit must be paid to the cashier of the local Provincial Director of Posts and Telegraphs by the applicant for the licence.



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10. Every contract by the licensee, having for object the hire, amalgamation, partial or complete transference of the licence or licences, cannot take place before obtaining in advance the approval of the Government.

11. The licence is considered as expired should the licensee fail to complete and have ready for service for radiotelegraphic or radiotelephonic installation within the time stipulated as per paragraph (e) Art. 9.

The licence is considered as expired on the death of the licensee.

12. The officials of the State Telegraphic Administration shall be responsible for the maintenance of the installation and proper upkeep of the radiotelegraphic and radiotelephonic land stations for which a licence is granted; they shall satisfy themselves that the licensee observes the law and the present regulations and that the licensee fulfils all the obligations imposed upon him by his contract with the Government.

13. Every licensee for a radiotelegraphic or radiotelephonic installation for private use, excepting the cases considered in Art. 8, will pay in advance to the State an annual fixed tax of £1t.50.

To guarantee the said tax the licensee must make a deposit as guarantee equal to the amount of fixed tax for one year.

14. Every licensee for radiotelegraphic or radiotelephonic installations for public use will pay every year to the State in quarterly instalments a tax corresponding to 10 per cent. of the revenue from radiotelegraphic or radiotelephonic charges on the basis of the common tariff.

To guarantee the said tax the licensee will make a deposit as guarantee of not less than £1t.200. If after one year the guarantee shows to be less than the amount due to the State for one year, then the deposit must be brought to the level of such proportion.

15. The period of the licence and the obligation of the tax established by Arts. 13 and 14, begin from the month following the decree granting the licence.

16. The deposits as per Arts. 13 and 14 will be forfeited to the public exchequer in case of withdrawal or termination of a licence.

Should the licensee fail to provide for the payment of the taxes due as per Arts. 13 and 14, the Government will apply the deposit, which should be increased in its integral amount within ten days of the said confiscation.

SECTION 4.

17. *Qualifications for the Radiotelegraphic and Radiotelephonic Service.*—The staff necessary for the management and working of the radiotelegraphic and radiotelephonic service is appointed as follows:—

(a) For the stations under the control of the Ministry of Posts and Telegraphs, from amongst the officials of specialists of first, second, third and fourth class.

(b) For the stations under the control of the Ministry of War, amongst the officers and privates of the engineers of the R. Army.

(c) For the stations under the control of the Admiralty, from amongst the officers of the staff and the marines.

Should it at any time be found convenient to the management and working of the above-mentioned stations, a mixed staff selected from the three Administrations can be employed.

The Ministry of the Posts and Telegraphs can for an educational purpose always send its own staff to the radiotelegraphic and radiotelephonic commercial stations by making previous arrangements with the interested Administration.

18. The staff to be employed in the radiotelegraphic stations licensed to private persons must possess a certificate proving their professional ability.

Such a document is granted either by the Ministry of Posts and Telegraphs, or by the Admiralty, according to the service for which it is intended.

SECTION 5.

19. *Limitations to the use of Radiotelegraphic and Radiotelephonic Apparatus.*—Cargo and passenger vessels are prohibited from using their own radiotelegraphic or radiotelephonic stations when they are at anchor in the State waters, except in the case of giving warning of danger or appeals for help, or when they are about to sail, or for urgent reasons within half an hour after their arrival and when the communication with the land is cut off for special reasons or for sanitary measures.

A breach of this rule will render the transgressor liable to the penalties imposed by Art. 3 of the law.

SECTION 6.

20. *Taxes.*—The tax for one radiotelegram is composed:—

(a) Of the radiotelegraphic tax due to the coast station;

(b) Of the radiotelegraphic tax due to the station on board;

(c) Of the telegraphic tax.

For taxation purposes only those radiotelegrams exchanged with Ship stations are considered.

21. All the radiotelegraphic and radiotelephonic stations installed before the promulgation of the law must apply for a licence within one calendar month of the present regulation.

C The following paragraph relating to Wireless Telegraphy is taken from the "Law of June 30th, 1912," which contains regulations concerning marine, commercial and postal services:—

"The undertakers (of said services) are obliged to adopt (on board their ships)..... wireless telegraph and telephone apparatus, whose system and power will be indicated, and, if necessary, modified by the Ministry of the Navy."

D *The OFFICIAL STATUTE BOOK of the Kingdom of Italy contains the following decree, numbered 1587 and dated at Rome November 12th, 1916.*

In pursuance of the law of May 22nd, 1915, No. 671, which confers extraordinary powers on His Majesty's Government and in pursuance of the law of June 5th, 1910, No. 395, and the relative regulations appertaining thereto, approval by Royal Decree of February 1st, 1912, No. 227, and in pursuance of the Royal Decree of July 11th, 1913, No. 1006, which gives effect to the International Radiotelegraphic Convention of London; and the Ministers in Council having given due consideration to the proposals placed before them by the Ministers of Maritime and Railway Transports and of Marine, in concert with the Minister of Posts and Telegraphs;

We have decreed and we hereby decree:—

ART. 1.—All vessels of commerce, whether propelled mechanically or by sails, whether they transport passengers or not, if they have on board a total of fifty persons or more, must, whilst at sea, carry an equipment of radiotelegraphic apparatus.

ART. 2.—From this obligation are exempted vessels on which the number of persons on board is exceptionally and accidentally increased to fifty or more, on account of *force majeure* or because the captain has been obliged to increase the number of his crew to make up for those who are ill, or on account of his having been obliged to transport persons picked up at sea or other persons.

There are also exempted from this obligation:—

(1) Vessels which during their voyage do not travel at a distance of more than 150 nautical miles from the nearest coast.

(2) Vessels on which the number of persons present on board is exceptionally or eventually increased to fifty or more, after embarkation, during a part of the voyage, of extra hands which it is found necessary to bring in for the handling of goods; on condition, however, that the aforementioned vessels do not perform trans-oceanic voyages and that, during the above-mentioned part of their voyage, they remain within thirty degrees latitude north and south.

(3) Sailing vessels of primitive construction whose build renders it impossible for them to be equipped with radiotelegraphic apparatus.

ART. 3.—Vessels, which by virtue of Art. 1 above-mentioned are required to be equipped with radiotelegraphic plant, are, as regards the Radiotelegraphic Service, divided in three classes, according to the classification of ship stations (prescribed by Article XIIIb) of the regulations annexed to the Radiotelegraphic Convention, signed in London on July 5th, 1912, viz:—

First Class.—Vessels possessing continuous wireless service. In this first class are included vessels able to carry on board twenty-five passengers or more:—

(i) If they have an average speed of fifteen knots or more.

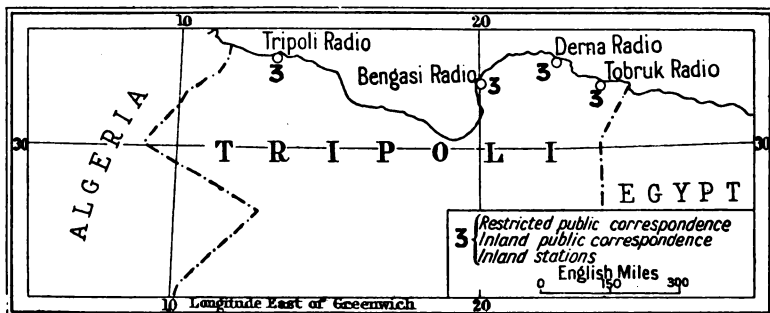
(ii) If they have an average speed of over thirteen knots, but only on the double condition (a) that they have on board 200 persons or more (passengers and crew), and (b) that they perform, during their voyage, a journey of over 500 nautical miles between two consecutive ports of call. It is, however, allowable for these vessels to be included in the second class on condition that the listening-in service be continuous.

Second Class.—Vessels possessing a wireless service limited to certain hours.

In the second class are included vessels able to carry on board twenty-five passengers or more, if they are not, for other reasons, included in the first class.

Vessels of the second class must, whilst at sea, keep a permanent listening-in service of at least seven hours per day, and must, in addition, listen-in for ten minutes at the beginning of each of the remaining hours.

Third Class.—Vessels possessing a wireless service with no fixed hours of working.



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In the third class are included all vessels which are not included in the first or second classes.

The owner of a vessel included in the second or third class has the right to demand that, in the certificate which is issued to him, the vessel in question be allocated to a superior class, if the said vessel satisfies all the requirements of that class.

ART. 4.—Vessels, which by the terms of Article 1 (above) must be equipped with radiotelegraphic plant shall be required to maintain whilst at sea a continuous listening-in service, if the Government shall judge that it is useful for the safety of life at sea.

In any case a continuous watch is required by :—

1. Vessels which possess an average speed of over thirteen knots; which have on board 200 persons or more; and which perform during their voyage journeys of over 500 nautical miles between two consecutive ports of call, even when those vessels are classified in the second class.

2. Vessels of the second class, during the whole time when they are voyaging over 500 nautical miles distant from the nearest coast.

3. Other vessels indicated in Article 1 when they are in the trans-Atlantic service; or, whilst in other services, when their itinerary requires them to go over 1,000 nautical miles from the nearest coast.

Vessels used for all kinds of fishing purposes, including whalers which are required to be equipped with radiotelegraphic plant, are not obliged to maintain continuous listening service.

The continuous listening service can be performed by one or more telegraphists holding one of the certificates prescribed in Article X of the regulations annexed to the International Radiotelegraphic Convention of 1912, and also, if necessary, by one or more qualified listeners (*ascoltatori patentati*).

Nevertheless, should a reliable automatic alarm apparatus be invented, the continuous listening service may be maintained by means of that apparatus, after its use has been duly authorised by the Ministry of Maritime and Railway Transports.

By the term duly qualified listener (*ascoltatore brevettato*) shall be understood a person holding a certificate of competency issued by an administrative authority established for the purpose. To obtain such a certificate, the applicant shall be required to prove that he is competent to receive and to understand the radiotelegraphic distress signal and safety signal.

The registered owner shall take the necessary steps to provide that secrecy with regard to communications shall be respected by the qualified listeners in his employ.

ART. 5.—The Radiotelegraphic apparatus obligatory fitted in accordance with Article 1 must be able to transmit, by day, from vessel to vessel, signals clearly perceptible under normal circumstances and conditions, at a minimum distance of 100 nautical miles.

Every vessel obliged, under the terms of Article 1 above mentioned, to be equipped with radiotelegraphic apparatus (in whatever category it may be classed), be fitted in conformity with Article XI of the regulations annexed to the International Radiotelegraphic Convention of 1912, with an auxiliary radiotelegraphic apparatus, every part of which shall be kept in a location as absolutely secure as possible.

In any case, the auxiliary apparatus must be entirely situated in the upper parts of the vessel, as high up as may be found practicable.

The auxiliary apparatus shall, as provided in Article XI of the regulations annexed to the International Radiotelegraphic Convention of 1912, possess a source of power devoted to that purpose alone. The apparatus must be capable of being speedily adjusted and employed besides being able to be worked for at least six hours, with a minimum range of eighty nautical miles for vessels of the first class, and of fifty nautical miles for vessels of the other two classes.

If the normal apparatus, the range of which under the terms of this Article covers at least 100 nautical miles, satisfies all the conditions indicated above, there is no obligation to carry also an auxiliary apparatus.

ART. 6.—Every installation must, after the owner has sent in his request, and before it starts working, be inspected and approved by the competent authorities; the Certificate of Inspection, which constitutes a working licence in accordance with Article IX of the regulations annexed to the Radiotelegraphic Convention of 1912, shall contain details of the apparatus as far as they relate to the terms of the concession; it shall be drawn up in duplicate, and one copy thereof shall be handed to the commander of the vessel; but the copy shall not be thus issued if the appraa us does not comply with the conditions laid down in the Radiotelegraphic Convention of 1912 and in the present decree.

ART. 7.—Every captain of a vessel who receives a distress call from a vessel in danger is obliged to go to the help of those in danger.

The captain of every vessel in danger has the right to select from those vessels which have answered his call that vessel or vessels which he considers to be the most capable of affording him help. He should only avail himself of such right after having consulted, as far as possible, the captains of the vessels themselves. The latter are obliged to comply immediately with such request, going with all speed to the help of those in danger.

The captains of the vessels upon whom devolve the duty of rendering assistance are released from their obligations as soon as the captain or captains requisitioned have made known that they are ready to obey the requisition; or as soon as the captain of one of the vessels which has reached the scene of the catastrophe shall have made known to them that their help is no longer necessary.

If the captain of a vessel finds it impossible, or does not consider it reasonable or necessary under the special circumstances of the case, to go to the help of the vessel in danger, he immediately informs the captain of the latter. He must also enter in his log the full reasons prompting his decision.

ART. 8.—With regard to the terms of Article 1, shipowners or their representatives shall, within fifteen days of the publication of the present decree, make application to the Ministry of Posts and Telegraphs for any concession required for existing vessels (in accordance with Article 1) not already equipped with radiotelegraphy and not excused from the installation of such apparatus under the provisions of Article 2.

When it is desired to nationalise any vessels after the date of the present decree, and such vessels come within the scope of the conditions laid down in Article 1, neither the necessary

nationalisation papers nor any provisional certificate will be issued unless the shipowner shows that he has made the proper application for a licence to instal radiotelegraphic apparatus on board.

Existing licences, notwithstanding the provisions of Article 7 of the regulations regarding radiotelegraphy at present in force, shall remain valid throughout the duration of the war. On their expiry the shipowner shall make application for a renewal in accordance with the Article above-mentioned; moreover it is further incumbent upon the shipowner to continue to work the ship station until the new licence has been obtained.

On the official licence there shall be entered a date on which each ship installation must be ready to work, this date will be estimated on the importance of the services for which the vessel is destined, and in accordance with the opinion of the competent authorities.

For vessels which had a radiotelegraphic station, but which did not have the auxiliary apparatus required under the above-mentioned regulations, there is granted a period of one year from the date of the present decree to put the matter in order.

ART. 9.—Vessels whose owners shall not have made application for a radiotelegraphic licence within the period fixed by Article 8; or those whose owners, having obtained their licence, have nevertheless neglected to put the station in working order, either in accord with the above-mentioned provision, or in accord with the term-limit inserted in the licence itself, may be refused the right of working cargoes.

Whenever vessels which have not complied with their obligation to instal radiotelegraphic apparatus are obliged to put to sea either because they have public services to fulfil, or for any reason of national importance, the Minister of Transports shall have the power to issue official instruction that the station shall be installed and put in working order at the expense of the owner of the vessel.

The same power is granted to the Minister of Transports in cases where the vessels referred to in Article 1 navigate waters outside the limits set forth in Article 2.

The expenses incurred for such official installation of apparatus and for the putting in working order of the same shall be recoverable in the manner indicated in Art. 205 of the laws governing the Mercantile Marine.

TEMPORARY PROVISIONS.

ART. 10.—It is therefore hereby rendered obligatory for the period of the war (and in any case, for not less than three years from the date of the licence) that all mechanically propelled mercantile vessels (of a gross tonnage of 2,000 tons or more in the case of cargo ships and of 1,500 tons or more in the case of passenger vessels) shall instal and maintain radiotelegraph stations in accordance with the existing laws and regulations, even though they are not compelled to apply for a radiotelegraph licence in accordance with Article 1.

ART. 11.—At the discretion of the Minister of Transports and following upon a request of the owners of the vessel, those vessels which perform voyages between ports of the Kingdom, excluding the Colonies, and which do not go beyond twenty miles from the coast, may be relieved of the obligation set forth in the preceding Article.

ART. 12.—The regulations contained in Articles 3 and 9 are intended to apply also to

those Articles alluded to in these temporary provisions, except as regards the duration of the concession and the obligation to apply for its renewal. However, in the case of these vessels a special auxiliary plant is not indispensable and it will be sufficient if the range of the station does not fall below eighty nautical miles, and that it is possible for regular transmission to be carried out at any moment.

* ART. 13.—The Commission for Insurance against war risks at sea, sitting at the "National Insurance Institute," in determining the premiums in respect of vessels, shall take into account the existence on board of radiotelegraph apparatus, whether temporary or permanent, in accordance with these temporary provisions.

ART. 14.—In order to insure the working of the radiotelegraphic service on mercantile vessels, operators not indispensable for the Royal Army and for the Royal Navy, will be exempted from military service at the request of the Ministry of Maritime and Railway Transports.

ART. 15.—The present decree takes effect from the day of its publication in the *Official Gazette* of the Kingdom of Italy.

We order that the present decree, stamped with the seal of State, be inserted in the official collection of laws and decrees of the Kingdom of Italy, ordering that everyone whom it concerns may observe it or cause it to be observed.

Dated Rome, November 12th, 1916.

Royal Decree No. 2223.

VITTORIO EMANUELE III.
By the grace of God and the will of the Nation, King of Italy.

Having seen the law of 30th June, 1910, No. 395, and the relative regulations approved by Royal Decree 1st February, 1912, No. 227;

Having seen the Royal Decree No. 1002 of 11th July, 1913, ratifying the International Radiotelegraphic Convention of London, 1912, and the acts thereto annexed;

Having seen the Royal Decree of 28th December, 1913, No. 1480, which extends to the radiotelegraph service in the Italian Kingdom the provisions of the above-mentioned Convention of London;

Having recognised the necessity of establishing—in harmony with the provisions of Article X of the Service Regulations annexed to the aforementioned Convention of London—opportune regulations for the issue of Government certificates to radiotelegraphists desirous of performing radiotelegraph service on board mercantile vessels;

On the proposal of the Minister Secretary of State for the Navy, in agreement with the Minister of Posts and Telegraphs;

We have decreed and we decree:

ART. 1.—Certificates of competency to perform radiotelegraphic service on board commercial vessels, as contemplated in Article X of the Service Regulations annexed to the International Radiotelegraph Convention of London, will be issued by the School of Semaphorists and Radiotelegraphists of the Royal Navy at Spezia (Comando difesa militare) marittima.

2. At the aforementioned school shall be instituted and maintained up to date a general register of all the candidates examined, with particulars of the examination undergone by each candidate, and the result. The school

shall also preserve in its archives a copy of the photograph of each candidate, furnished with all the particulars entered in the general register and also a personal description of the candidate.

The Ministry of Marine shall be empowered to authorise, when circumstances require and merely as an exceptional case, that candidates shall be examined at other branches of the Royal Navy, but the examination must always be conducted under the supervision of the officials of the Royal School of Semaphorists and Radiotelegraphists.

ART. 2.—Candidates shall be examined by a suitable commission composed of:

The Director of the aforementioned School or a superior officer of the Staff of the Royal Navy.

Two officers or officials of the Royal Navy who are specialists in radiotelegraphy.

The commission will assemble in the early days of each month.

ART. 3.—Candidates, in order to be admitted to the examinations, shall forward, in due time, an application on stamped paper to the value of two lire addressed to the "Direzione della regia scuola semaforisti e radiotelegrafisti Spezia," and such application must be accompanied by the following documents:

Certificate of study (not less than the "licenza elementare").

Authentic copy of birth certificate proving that the applicant has completed his eighteenth year but is not more than thirty years of age;

"Certificato di penali" (police certificate of good conduct), the date of which must not be more than two months prior to the date of presentation of such document;

Certificate of good conduct and personal character issued by the Mayor of the Commune in which the applicant is resident, bearing the visé of the Prefect or Sub-Prefect;

Any certificates testifying to the applicant's knowledge of radiotelegraphy and foreign languages;

Certificate of Italian citizenship;

Certificate of entry in the lists of the military or naval levies and the certificate of service performed;

Two photographs;

Postal order for L.2.05, the fee for the certificate of radiotelegraphy. (This amount will be refunded to candidates failing to pass the examination.)

The candidate shall declare in the application whether he has undergone previous examination, and if so the date and place of such examination.

N.B.—A man presenting the certificate of "esito di leva" or the extract of the "matricola della gente di mare" will not be required to present a certificate of Italian citizenship.

All documents shall be presented on paper stamped to the prescribed amount, unless the applicant is able to show, by authentic document, that he is in a state of poverty. The application, however, must always be written on stamped paper.

ART. 4.—Applicants who are admitted to the examinations after having presented the prescribed application duly documented will be notified by the School authorities as to the day on which they are to present themselves to undergo the test.

ART. 5.—The Examining Commission shall rigorously satisfy itself that the candidate fulfils the conditions prescribed in the aforementioned Article X of the Regulations—

namely, that he possesses a perfect knowledge of the radiotelegraph apparatus as shall enable him to render efficient radiotelegraph service on board ship.

Candidates must possess the knowledge of radiotelegraphy stipulated in Appendix A (programme of examination for the granting of Government radiotelegraph certificates), signed, on Our order, by the Minister of Marine.

ART. 6.—In addition to the above-mentioned tests candidates must undergo practical tests in transmission and oral reception, the duration of such tests to be not less than ten minutes.

In connection with the provisions of Article X of the Regulations of Service annexed to the International Radiotelegraph Convention of London, shall be issued:

A first-class certificate in radiotelegraphy to those who attain a speed of transmission and oral reception not less than twenty words per minute in a foreign language;

A second-class certificate in radiotelegraphy to those who attain a speed of transmission and oral reception not less than twelve and not exceeding nineteen words per minute in a foreign language. An average of five characters per word shall be taken as a basis for calculation.

ART. 7.—The aforementioned certificate shall be designated "Brevetto internazionale di radiotelegrafista" and shall bear the photograph of the holder, duly legalised by the stamp of the authority of the Royal Navy, and the personal description of the holder and the qualifications attained.

ART. 8.—Applicants who have been declared by the Examining Commission to be unqualified to receive the International Radiotelegraph Certificate cannot present themselves for further examination if at least six months have not elapsed from the date of the first examination.

ART. 9.—Radiotelegraphists who have obtained a second-class certificate in radiotelegraphy shall only undergo the examination to obtain a first-class certificate after three months have elapsed from the date of the last examination.

ART. 10.—Candidates who have been found unqualified after two consecutive examinations cannot undergo a further test without the special and exceptional authorisation of the Ministry of Marine (Direzione generale di artiglieria e armamenti).

ART. 11.—The issue of duplicate international certificates in radiotelegraphy is forbidden without the special authorisation of the Ministry of Marine (Direzione generale di artiglieria e armamenti).

ART. 12.—Radiotelegraphists must undertake to maintain the secrecy of correspondence.

ART. 13.—All violations of the secrecy of correspondence, of the International Radiotelegraph Convention and the relative regulations, and of the general rules governing the working of radiotelegraph stations open to public service will be punished by the temporary or permanent withdrawal of the radiotelegraphist's certificate, according to the seriousness of the infraction committed by the radiotelegraphist, irrespective of any more severe punishment that may be imposed.

ART. 14.—The present decree will enter into force from the day of its publication in the *Gazzetta ufficiale*.

We order that the present decree, to which has been affixed the seal of State, be inserted in the official collection of laws and decrees of the Kingdom of Italy, and we enjoin its observance upon all those whom it may concern.

Given this day, November 4, 1919, at San Rossore.

VITTORIO EMANUELE,
Sechi-Chimienti.

Seen, The Keeper of the Seals :
Mortara.

APPENDIX A.

PROGRAMME OF EXAMINATIONS FOR THE GRANTING OF GOVERNMENT CERTIFICATES IN RADIOTELEGRAPHY.

Diagram of the various radiotelegraph apparatus used and the working of the individual parts.

A perfect knowledge of such apparatus, its adjustment and method of removing faults.

Tuning of a station. Rules relative thereto. Cimoscopi (?)

Receiving apparatus and the mode of using them.

Sources of energy which feed radiotelegraph

apparatus: Dynamos, alternators, transformers, converter groups and converters. Accumulators and their maintenance.

Measures necessary in the practice (working) of radiotelegraphy. Voltmeters, ammeter, methods of insulation.

Antennæ and earth.

Precautions to avoid damage to the material and staff during transmission.

Protection devices of the oscillatory circuits.

Perfect knowledge of the general working rules of radiotelegraph stations open to public service, and also of the International Radiotelegraph Convention and the Service Regulations annexed thereto.

Perfect knowledge of the conventional abbreviations.

Knowledge of foreign languages (optional).

Duties of the radiotelegraphist as regards the radiotelegraph service.

Secrecy of correspondence.

Rome, 4th November, 1919.

Seen, by order of His Majesty the King,
SECHI,
Minister of Marine.

JAMAICA

THIS "Land of Wood and Water" is the largest of the British West Indian Islands, covering an area of 4,450 square miles, and situated about 90 miles south of Cuba, between latitude $17^{\circ} 43'$ and $18^{\circ} 32' N.$; its longitude stretching from $76^{\circ} 11'$ to $78^{\circ} 21' W.$ It was discovered on May 3rd, 1494, by Columbus, and named after St. James. The Governor is assisted by a Privy Council and a Legislative Council, the latter consisting partly of nominated and partly of elected members. There are two wireless stations for public correspondence with ships.

ADMINISTRATION.

The Laws and Regulations under which radiotelegraphy is administered comprise the following :—

A—Telegraph Control Law, 1904.

B—Direct West India Cable Company's Law, 1909.

C—Regulations under Law of 1904.

D—Further Rules and Regulations.

E—Regulations under the Defence of the Island Law.

THE TELEGRAPH CONTROL LAW (7) OF 1904.

A 1. No person shall, within the Colony or any of its Dependencies, establish, maintain or use any telegraphic apparatus, mechanism, or contrivance, of what nature or kind soever the same may be, without due permission or licence under the hand of the Governor previously obtained for that purpose.

It is hereby expressly declared that what is commonly known as "wireless telegraphy," including the Marconi apparatus and any similar or other mechanism or contrivance whatsoever for the transmission of telegraphic messages without the employment of wires or cables, is a telegraphic apparatus, mechanism or contrivance within the meaning of this Section.

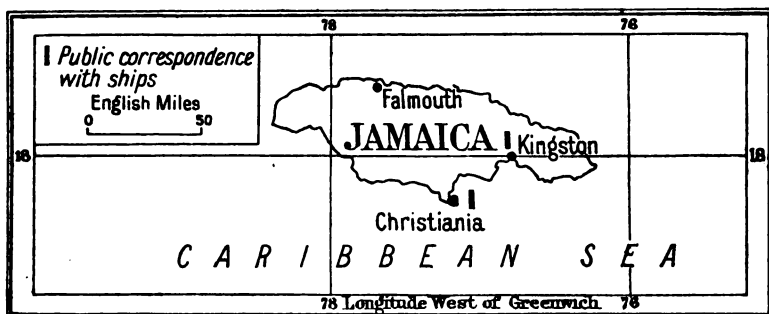
2. It shall be lawful for the Governor in Privy Council from time to time to make and as he shall see fit repeal, alter or vary rules and regulations for all or any of the following purposes, viz :—

Permitting or licensing any person to establish, maintain, or use any telegraphic apparatus, mechanism, or contrivance, whether for the service of the public or for any private purpose ;

Attaching conditions, restrictions, and limitations to the exercise of the privilege by such permission or licence conferred ;

Providing suitable penalties and forfeitures for the contravention of the prohibition above contained in Section 1 of this law, and to the breach of any rule or regulation made thereunder, and providing for the recovery thereof, summarily or otherwise ; provided that the penalty (over and above forfeitures) to be imposed for any one offence shall in no case exceed a fine of Two Hundred Pounds, or in default of payment thereof imprisonment, with or without hard labour, for a period not exceeding twelve months ;

The exercise of all such powers and control over telegraphic establishments (by temporarily entering into possession thereof or



otherwise) as may be necessary for the public safety, whether at all times, or in any case of emergency which may arise.

And generally for the better carrying out of the purposes of this law.

Such rules and regulations shall come into force as from the date of publication thereof in the *Jamaica Gazette*.

3. Nothing in this law contained shall invalidate or impair any legal right already possessed by any telegraph or cable company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance, and use thereof, or any other like matter.

4. Law 1 of 1903 is hereby repealed.

LAW 21 OF 1909.

THE DIRECT WEST INDIA CABLE COMPANY'S LAW, 1909.

B Whereas the Direct West India Cable Company, Limited, is desirous of establishing a wireless installation for communication between ships and the shore in Jamaica;

And whereas under the provisions of Law 7 of 1904, entitled "The Telegraph Control Law, 1904," no person shall establish, maintain or use within the Island of Jamaica, or any of its Dependencies, any apparatus or machine whereby communication by wireless telegraphy can be held between the said Island and ships, without having first obtained the sanction of and a licence from the Governor;

And whereas a licence to erect such a wireless station has been granted to the Direct West India Cable Company, Limited, by the Governor of Jamaica.

Be it enacted by the Governor and Legislative Council in Jamaica as follows:—

1. The protection, rights, powers, and facilities already granted to the Direct West India Cable Company, Limited, under Law 16 of 1898, entitled "The Direct West India Cable Company's Law, 1898," are granted and extended for the purposes of wireless telegraphy installation to be installed by the company or worked and maintained by them in so far as they may be applicable to the satisfactory and efficient working and maintenance of a wireless station or stations.

2. The Government of Jamaica shall acquire for the use and at the expense of the company a piece of land of sufficient dimensions at a place to be selected by the company and approved by the Government suitable and convenient for the economical erection, main-

tenance, and working of the installation, and when acquired such piece of land shall be conveyed to the company in fee simple, or if the Government of Jamaica possesses a piece of land of sufficient dimensions at a place approved by the company suitable and convenient for the economical erection, maintenance, and working of the installation and which the Government considers it desirable the company should have, the Government may sell the said piece of land at a price to be mutually agreed upon, or the Government may rent it to the company on such terms as may be agreed on during the period of the licence or for so long as the company may continue to work a wireless station or stations.

The acquisition of land by the Government of Jamaica under this section shall be deemed as an acquisition for public works within the meaning of the Public Lands Acquisition Law, 1897 (Law 31 of 1897).

REGULATIONS.

It will be noted that under Clause 2 of the Telegraph Control Law (7), 1904, the Governor in Privy Council has the power of making rules and regulations, and a set of rules were accordingly promulgated during the year 1909, under which the working of wireless telegraphy is now being administered in Jamaica. These rules read as follows:—

C 1. Any licence granted under Law 7 of 1904 shall only entitle the licensee to establish, maintain and use that particular class of telegraph apparatus, mechanism, or contrivance mentioned in the licence. Every licence granted under the said law shall make mention of and fully describe the particular class of telegraphic apparatus, mechanism or contrivance which the applicant proposes to establish, maintain and use.

2. Every person establishing, maintaining or using any telegraphic apparatus, mechanism or contrivance in contravention of Section 1 of the Telegraph Control Law, 1904 (Law 7 of 1904), shall be liable to penalty not exceeding two hundred pounds, or, in default of payment, to be imprisoned with or without hard labour for a period not exceeding twelve months, and the telegraphic apparatus, mechanism or contrivance so established, maintained or used shall be liable to be forfeited to the Government of Jamaica.

3. Every person licensed under this law, who uses any telegraphic apparatus, mechanism or contrivance, for which he has not a licence shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

4. Every person licensed under this law who acts contrary to the terms of this licence shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

5. Proceedings for penalty and forfeiture under these rules shall not be taken except upon the authority of the Attorney-General.

6. Proceedings for the recovery of any penalty and for any forfeiture under these rules shall be of a summary nature and shall be taken before the Resident Magistrate for Kingston.

FURTHER RULES.

D *Further Rules and Regulations made by the Acting Governor in Privy Council under the Telegraph Control Law, 1904, Law 7 of 1904.*

1. All apparatus for wireless telegraph on board a merchant ship in the territorial waters of this colony shall be worked in such a way as not to interfere with (a) naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed or worked in the colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraph on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the colony except with the special or general permission in writing of the Governor.

3. These rules and regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

4. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of the wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules and regulations as may be made by the Governor from time to time, and such rules and regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. The master of any merchant ship on board of which apparatus for wireless telegraphy shall be worked or used contrary to these rules and regulations shall on summary conviction before a Resident Magistrate be liable to a penalty not exceeding two hundred pounds, and in default of payment to be imprisoned with or without hard labour for a period not exceeding twelve months.

REGULATION UNDER THE DEFENCE OF THE ISLAND LAW.

E Whereas by the powers conferred by Law 9 of 1915, the Defence of the Island Law, 1915, the Governor in

Privy Council on the 7th day of August, 1917, made certain Regulations called the Defence of the Island (Consolidation) Regulations, 1917:

And whereas the said Regulations have been amended from time to time by the Governor in Privy Council:

And whereas it is expedient further to amend the said Regulations in manner hereinafter appearing:—

Now, Therefore, the Governor by and with the advice of Privy Council doth order and it is hereby ordered as follows:—

After Regulation 43 the following Regulation shall be inserted:—

43A. (1) Every British sea-going ship of sixteen hundred tons gross tonnage or upwards in respect of which a licence to instal wireless telegraph apparatus has been granted by the Governor in Privy Council shall be provided with a wireless telegraph installation, and shall maintain a wireless telegraph service, and shall be provided with two certified operators, together with suitable accommodation for the apparatus and operators.

(2) Application to the Governor in a form prescribed by him for such a licence shall, unless a licence has before the making of this regulation been granted in respect of the ship, be made on or before the 1st day of May, 1918, by the owner of every such ship which is registered in Jamaica.

(3) The Governor shall, and when wireless telegraph apparatus and the services of operators become available for the purpose, cause licences to be issued in respect of such ships as in the opinion of the Governor should in the national interests be fitted with such apparatus, and the licences shall specify the date as from which the carrying of such apparatus, under this regulation is to be compulsory, the character of the apparatus, and the qualifications of the operators.

(4) The Governor may:—

(a) Extend the time mentioned in the licence as the time within which any apparatus is to be provided; and

(b) exempt any ship from the obligations imposed by this regulation.

(5) If the provisions of this regulation or the terms of any licence granted thereunder are not complied with in the case of any ship, the master or owner of the ship shall be guilty of a summary offence against these regulations, and if any master fails to make an application in accordance with this regulation he shall be guilty of a summary offence against these Regulations, and in either case if the ship is at any time subsequently found at a port or off within the territorial waters adjoining Jamaica the ship may be seized and detained.

(6) In this Regulation expressions have the same meaning as in the Merchant Shipping Acts, 1894 to 1914.

Made by the Governor in Privy Council this 9th day of April, 1918.

D. H. HALL,
Clerk, Privy Council.

JAPAN

THE total area of Japan is 24,794.36 square *ri* (the Japanese *ri* is about 2.5 English square miles). This is exclusive of Korea, Formosa, and Sakhalin, the sum of whose area amounts to 18,664.02 square *ri*. The realm ruled by the Emperor Yoshihito lies geographically between 21° 45' and 50° 56' N. latitude, and between 119° 18' and 156° 32' E. longitude.

CONTROL.

The Department of Communications controls all Government stations and inspects all private stations in Japan. These are divided as follows:—

Public service to ships	..	..	..	10
Government traffic only	..	..	..	4
Public restricted service	..	..	..	1
Public transocean traffic	..	..	..	1
Private traffic	..	..	..	1

Besides these stations, the Korean Government has five Government stations, but they are not yet opened for public communication. The Formosan Government has one land station, and the Government General of Kwantung possesses three Government stations, all open for public communication. In addition, there are many Navy and Army stations under the control of the Navy and Army Departments.

Wireless work in the Department of Communications is divided into two sections: (a) The Research Laboratory, and (b) the Installation and Inspecting Section.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Nardkichi Yoneda	Director-General of Posts and Telegraphs	Tokyo
Mr. Utarō Noda ..	Minister of Communications ..	Tokyo
Mr. Toyosuke Hada ..	Vice-Minister of Communications ..	Tokyo

WIRELESS RESEARCH LABORATORY.

Official.	Title.	Address.
Dr. W. Torikata ..	Chief of Wireless Research Laboratory	No. 2801, Sanno, Omori, near Tokyo
Mr. E. Yokoyama	Wireless Engineer	No. 2, Uenosakuragicho, Shitayaku, Tokyo
Mr. K. Kitamura	Assistant Wireless Engineer ..	Hiraiso, Ibarakiken
Baron T. Kikuchi	Assistant Wireless Engineer ..	No. 124, Takebayacho, Kioshikawa, Tokyo
Mr. N. Marumo ..	Assistant Wireless Engineer ..	No. 20, Aoyama Kitamachi 7, near Tokyo
Mr. E. Tsumori ..	Assistant Wireless Engineer ..	No. 151, Shirokanemazatocho, Shitayaku, Tokyo
Mr. Y. Nozuki ..	Assistant Wireless Engineer ..	Isohama, Ibarakiken

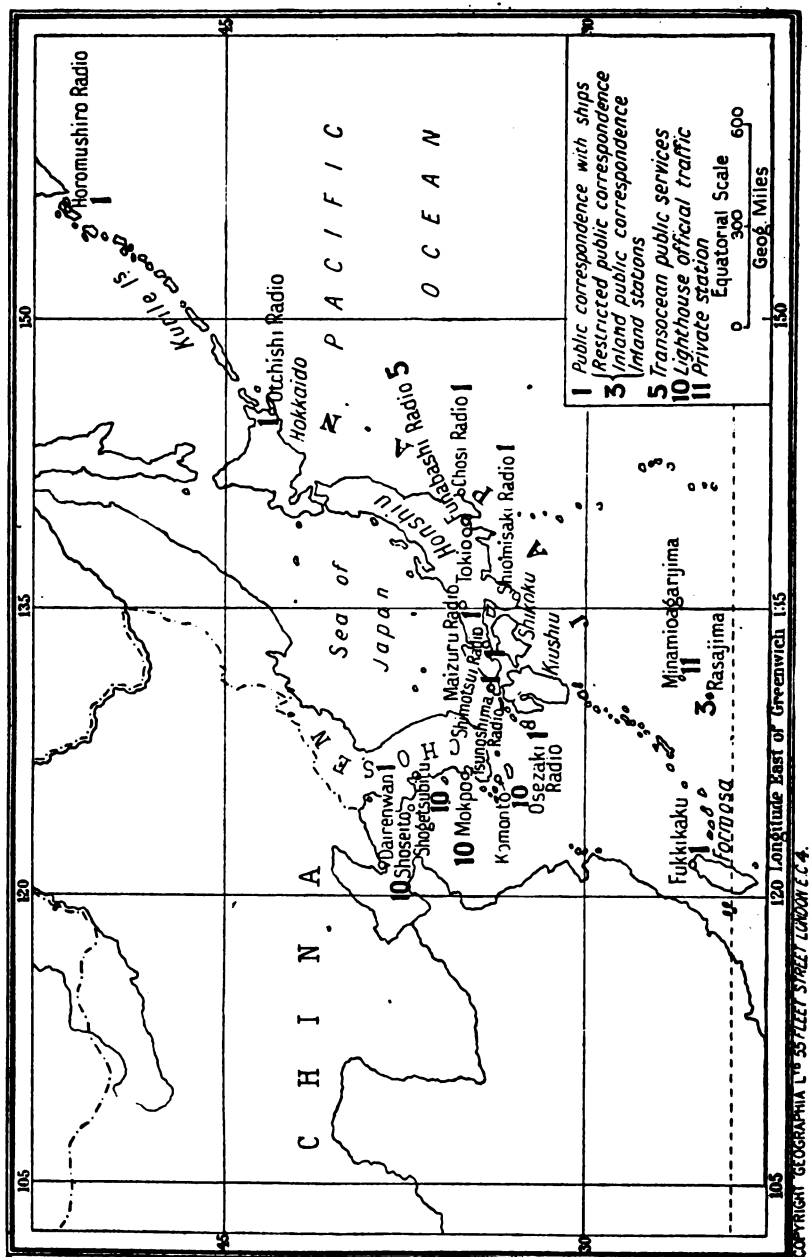
WIRELESS INSTALLATION AND INSPECTING SECTION.

Official.	Title.	Address.
Mr. M. Saeki ..	Chief of Wireless Installation and Inspection	No. 23, Kasumicho, Azabuku, Tokyo
Mr. T. Nakagami	Wireless Engineer	No. 82, Kikuzaka, Hongo, Tokyo
Mr. Y. Yoshida ..	Assistant Wireless Engineer ..	No. 30, Nagasaka, Azakuku, Tokyo
Mr. N. Wakamatsu	Assistant Wireless Engineer ..	No. 21, Shirokanedaimachi, 2 Shibaku, Tokyo
Mr. U. Koyama	Assistant Wireless Engineer ..	No. 324, Shirokanesankocho, Shibaku, Tokyo

ORGANISATION.

The first wireless experiment in Japan was carried on, in 1896, according to the conduction method, and electric-wave telegraphy has formed a subject of Japanese research since 1897, its practical utility being first sufficiently proved by the experience of the Japanese Navy in the Russo-Japanese War. The first commercial wireless station was erected in May, 1908, at Choshi, about 80 miles east of Tokyo. Since that time the number of stations has been largely increased.

There are two leading companies manufacturing wireless apparatus in



Japan—the Annaka Wireless Works and Nippon Radio Works. Of these, the Annaka Works has the larger output, and has manufactured nearly 80 per cent. of Japanese wireless apparatus now in use.

At the Tokyo Naval Arsenal Research Laboratory steady progress has been made in scientific research. In 1919 wireless telephony was installed on war vessels, thereby assuming great importance from a military standpoint. The feature of this invention is its simplicity compared with others of the kind. Commander Hattori, Engineer Hayashi and Engineer Matsuda, who took a leading part in the perfection of this invention, have been honoured with decorations in recognition of their distinguished service. Thanks to the strenuous efforts of the Laboratory, the study on frequency changers was also crowned with success. In comparison with their progress, originality and other features are shown in the manufacture of vacuum tubes in Japan.

A large wireless station is now working in Formosa constructed by the Japanese Navy with materials produced in Japan. It was opened for service early in 1920.

The Fukushima Wireless Station now under construction is expected to be completed very shortly, and will have cost 900,000 yen. The new station will mainly be used for communications in the Pacific in general and with the United States in particular.

In recognition of the satisfactory result of the study on wireless telephony in the Navy, Messrs. Fusakichi, Hayashi and Oishi each received a medal for his services.

A monthly magazine named *Musen-no-Nippon*, or *Wireless Press*, has been started by Mr. Aqira Kajima, of the Nippon Radio Company, and is the only magazine of its kind in Japan.

ADMINISTRATION.

The first wireless regulations in Japan were promulgated in April, 1908, under the Telegraph Law of 1900. A number of additions and modifications have since been made of these regulations, and these are now incorporated in the Wireless Telegraph Law, which was promulgated and took effect in 1915. The texts of these laws and regulations now in force are shown in the following pages in accordance with the list below :—

A—Wireless Telegraph Law No. 26.

B—Wireless Telegraph Regulations No. 16 (Japanese reference No. 41-48).

D—Foreign Wireless Telegraph Regulations.

C—Regulations relating to Private Wireless Telegraphs.

E—Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs.

WIRELESS TELEGRAPH LAW.

(Law No. 26, June 19th, 1915.)

ART. 1.—All wireless telegraphs and telephones shall be under the control of the Government.

ART. 2.—Wireless telegraphs and telephones referred to below may be privately established with the permission of the responsible Minister, to be determined by an Order.

(i) Installations on board vessels with the object of assuring safety to navigation.

(ii) Installations on board vessels for communication between vessels engaged in a specific business belonging to one person, with the object of facilitating such business.

(iii) Installations on board vessels or on land for the exclusive use of private persons and communicating with telegraph offices for the dispatch and receipt of telegrams, but disconnected from public telegraph, telephone, wireless telegraph or wireless telephone communications,

(iv) Installations on board vessels or on land with the object of facilitating a specific business belonging to one person by mutual communication on land or between land and vessel, disconnected from public telegraph, telephone, wireless telegraph or wireless telephone communications, but to which the preceding clause is not applicable.

(v) Installations with the exclusive object of carrying out experiments in connection with wireless telegraphy or telephony.

(vi) Installations recognised as necessary by the responsible Minister, but not coming within the purview of the preceding clauses.

ART. 3.—Restrictions relating to private wireless telegraph and telephone apparatus, their installation and employment, together with the qualifications of persons operating private wireless telegraphs, will be determined by an Order.

ART. 4.—Private wireless telegraphs and

telephones must not be used for purposes other than those for which they were established. Provided that their use shall not be prevented for signals of distress at sea, meteorological reports, time signals and in other cases, to be determined by an Order, where public utility is recognised by the responsible Minister.

ART. 5.—Wireless telegraphs and telephones installed on foreign ships may only be used in accordance with the provisions of Article 2. Provided that their use shall not be prevented for Signals of Distress at sea and for communications with telegraph and telephone offices whilst on voyage.

ART. 6.—The responsible Minister may, by the issue of an Order, cause private wireless telegraphs or telephones to be used for the public service or for communications necessary for military purposes.

In cases coming within the purview of this Article the responsible Minister may, where deemed necessary, send officials to carry out the required operation.

ART. 7.—Where the responsible Minister deems it necessary in the interests of the public communications or on military grounds, he may withdraw his sanction from private wireless telegraphs or telephones or order changes in their equipment.

ART. 8.—Where the responsible Minister deems it necessary for the sake of public security, he may order a restriction of or suspension in the working of or the removal of instruments and accessories belonging to private wireless telegraphs or telephones or wireless telegraphs or telephones installed on foreign vessels.

In cases coming within the purview of this Article, the responsible Minister may, where deemed necessary, send competent officials to seal up instruments and accessories or to effect their removal.

ART. 9.—Where persons responsible for private wireless telegraphs or telephones have contravened this Law, Orders based on this Law, or provisions arising therefrom, the responsible Minister may withdraw his sanction from such wireless telegraphs or telephones or order the suspension of their operations.

ART. 10.—Where sanction has been withdrawn from wireless telegraphs or telephones established by private persons the dismantling of their apparatus and mountings will be required by order of the responsible Minister. This applies also in the case where private wireless telegraphs or telephones have ceased operations.

ART. 11.—Where private wireless telegraphs or telephones or telephones or telephones established on foreign vessels have been called upon to deal with signals of distress at sea, such service must not be refused.

ART. 12.—Immediately on receipt of signals of distress at sea, wireless telegraphs or telephones shall acknowledge them and report to the wireless telegraph or telephone most conveniently situated for purposes of rescue.

In cases coming within the purview of this Article, where request has been made for communication on specific matters, such communication should immediately be made regardless of the provisions of this Article.

ART. 13.—Where the responsible Minister has ascertained that any person has illegally set up a wireless telegraph or telephone, he may appoint competent officials to enter such

establishment, inspect the apparatus and mountings thereof, effect the removal of instruments and accessories, and take other steps appropriate to the circumstances.

ART. 14.—The Government may, for the purpose of establishing wireless telegraphs or telephones to meet the needs of public communications, require the use of part of a vessel, and in case of necessity order special provision and equipment. Under the provisions of this Article a suitable rent for accommodation and actual cost of special provision and equipment will be paid by the Government on application.

ART. 15.—Matters relating to the administration of wireless telegraphs, wireless telephones, telegraphs, telephones, mails, postal money orders and post office savings, or signals of distress at sea, time signals and meteorological reports may as determined by an Order be communicated free of charge by the wireless telegraphs or telephones provided for the public service.

ART. 16.—Persons who have set up wireless telegraphs or telephones without permission, or have made use of wireless telegraphs or telephones set up without permission, or those who have made use of private wireless telegraphs or telephones after permission has been withdrawn will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding one thousand yen.

In cases coming within the purview of this Article, where wireless telegraphs or telephones have been placed at the disposal of other persons in return for money or commodities, they shall be confiscated, and the total sum of money or value of commodities already disbursed or handed over shall be collected.

ART. 17.—Persons using private wireless telegraphs or telephones for purposes other than those for which they were established will be subject to a fine not exceeding one thousand yen.

In cases coming within the purview of this Article, where wireless telegraphs or telephones have been placed at the disposal of other persons in return for money or commodities, they shall be confiscated, and the total sum of money or value of commodities already disbursed or handed over shall be collected.

Persons applying to and having messages sent by private wireless telegraphs or telephones will be subject to a fine not exceeding one hundred yen.

ART. 18.—Persons contravening the provisions of Article 5 or disobeying Orders based on this Law for restricting or suspending the use, changing the equipment of or removing or dismantling wireless telegraphs or telephones will be subject to a fine not exceeding one thousand yen. Where persons engaged in the business of wireless telegraphs or telephones have used them in opposition to Orders for their restriction or suspension, this provision shall apply also to such persons.

ART. 19.—Persons refusing without just cause to furnish the use of wireless telegraphs or telephones under the provisions of Article 6 or of vessels or failing to make special provision or equipment under the provisions of Article 14, will be subject to a fine not exceeding one thousand yen.

ART. 20.—Persons violating the secrecy of wireless telegraph or telephone messages coming under treatment at telegraph or telephone offices will be subject to imprisonment with

hard labour for a period not exceeding one year or to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have divulged the secrets of messages under the provisions of this Article they will be subject to imprisonment with hard labour for a period not exceeding two years or to a fine not exceeding five hundred yen.

The offences dealt with in this Article must be established by prosecution.

ART. 21.—Persons illegally evading charges connected with wireless telegraphs or telephone or causing other persons to evade them will be subject to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have committed acts referred to in the preceding paragraph, they will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding five hundred yen.

ART. 22.—Persons dispatching false communications by wireless telegraph or telephone with the object of causing harm to other persons will be subject to imprisonment with hard labour for a period not exceeding two years or to a fine not exceeding five hundred yen.

Persons dispatching false communications by wireless telegraph or telephone with the object of adversely affecting the public welfare will be subject to penal servitude for a period not exceeding five years or to a fine not exceeding one thousand yen.

Persons dispatching by wireless telegraph or telephone reports of shipping casualties when there are in fact no shipping casualties will be subject to imprisonment with hard labour for a period of not less than three months and not exceeding ten years.

Persons engaged in the business of wireless telegraphs or telephones who have committed acts referred to in the first clause will be subject to imprisonment with hard labour for a period not exceeding five years or a fine not exceeding one thousand yen; in the second clause to penal servitude for a period not exceeding ten years; in the third clause to a term of imprisonment with hard labour of not less than one year.

ART. 23.—Where persons engaged in the business of wireless telegraphs have without just cause opened, damaged, concealed or thrown away telegrams sent by wireless telegraphy and coming under treatment at telegraph offices, or have delivered them to persons other than their proper recipients, they will be subject to penal servitude for a period not exceeding three years or to a fine not exceeding five hundred yen. Provided that cases coming within the purview of Articles 253 and 259 of the Criminal Code shall be dealt with according to that Code.

ART. 24.—Where persons engaged in the business of wireless telegraphs or telephones have, without just cause, neglected to deal with general public telegrams or communications necessary for military purposes, or have caused them to be delayed, they will be subject to imprisonment with hard labour for a period not exceeding one year or to a fine not exceeding two hundred yen.

Where persons engaged in the business of wireless telegraphs or telephones have, without just cause, failed to deal with reports of distress to vessels under the provisions of

Articles 11 or 12, or have caused them to be delayed, they will be subject to a term of imprisonment with hard labour of not less than one year.

Persons obstructing communication of reports of distress at sea will similarly be dealt with under the preceding clause.

ART. 25.—Persons obstructing, or committing acts calculated to obstruct, general public communications or communications necessary for military purposes sent by wireless telegraph or telephone will be subject to penal servitude for a period not exceeding seven years or a fine not exceeding five hundred yen.

ART. 26.—Unsummed attempts to contravene the provisions of the last ten Articles are punishable.

ART. 27.—Persons opposing, hampering or avoiding the competent officials appointed under this Law in the execution of their duty or failing to answer their questions or making false statements during the inspection required under the provisions of Article 13 will be subject to a penalty not exceeding one hundred yen.

ART. 28.—The provisions of the Telegraph Law, Articles 4, 5, 11 to 21, 23, 24 and 45 apply to wireless telegraphs and telephones employed for the general public service and communications necessary for military purposes.

SUPPLEMENTARY REGULATIONS.—The date of coming into force of this Law will be fixed by Imperial Ordinance.

The above Wireless Telegraph Law came into force on November 1st, 1915. Imperial Ordinance No. 186, October 25th, 1915.

WIRELESS TELEGRAPH REGULATIONS, No. 16.

DATED APRIL 8TH, 1908.

B ART. 1.—The expression "wireless telegram" means any telegram to be transmitted by wireless telegraphy.

ART. 2.—In the present Regulations the term "coast station" means any telegraph office on land equipped with wireless telegraph apparatus, and the term "ship station" means any telegraph office on board a ship equipped with wireless telegraph apparatus.

ART. 3.—Wireless telegrams shall bear the following, abbreviated instruction:—
"R A" in the case of Romanised telegrams.

ART. 4.—The name of a coast station through which a wireless telegram destined for a ship station is to be transmitted shall be indicated within parentheses in the address of the telegram, but such indication shall not be counted in the number of words even in the case of a Romanised telegram.

In case such coast station cannot transmit the telegram, but there is another coast station which is able to do so, the intermediary of the latter may be resorted to. If a telegram destined for a ship can be delivered direct to the addressee from a telegraph office on land, it may be delivered from such office without the use of wireless telegraphy.

(a) Wireless telegrams to be transmitted by way of intermediate ship station, with the exception of those handed in at a ship station, shall bear the following abbreviated instruction:—

"R S" in the case of Romanised telegrams.
Such intermediary transmission can in no circumstances be made more than once.

ART. 5.—If the sender of a wireless telegram destined for a ship station wishes to indicate the term during which his telegram is to be kept at the coast station, the number of days shall be inserted in the telegram as paid instruction.

Wireless telegrams without such instruction will be retained at the coast station for nine days from the day of handing in. However, in case the transmission of a telegram cannot be effected on account of the ship's station leaving out of the radius of action of the coast station or for any other reasons, the telegram may not be retained, if the retention is deemed unnecessary.

ART. 6.—If the sender wishes to prolong the term of retention mentioned in Art. 5, application to that effect shall be made to the coast station before the expiration of the term. The same applies to further prolongation of the term. In such case, the term of retention will be nine days, unless specially indicated.

The application shall contain the date of handing in, number of characters or words, and the names of the sender and addressee of the wireless telegram.

The sender may make the application mentioned in paragraph 1 through the office of origin. If he wishes it notified to the coast station by telegraph, he shall pay the charge for a paid service telegram for the purpose.

ART. 7.—The transmission of a wireless telegram is to be effected when both the sending and receiving offices are within the guaranteed range of action of each other.

ART. 8.—In the case of ships' distress, wireless telegrams informing the name of the ship in distress the location and condition of the doomed vessel and any other particulars necessary for rescue, shall be treated by coast or ship stations with absolute priority suspending all other communications.

ART. 9.—Paid service telegrams concerning enquiry, rectification, and stoppage of a wireless telegram to which reply is required can be exchanged only between telegraph offices on land.

ART. 10.—"Urgent telegrams," "redirected telegrams," and "telegrams with acknowledgment of receipt" are admissible between telegraph offices on land.

The sender of a wireless telegram with acknowledgment of receipt will be notified of the date and time at which the coast station has transmitted the telegram to the ship station.

(a) Telegrams of the same text originating from the same ship station or from the same telegraph office on land, and passing through the same coast station, may be made a multiple telegram, so far as concerns the transmission between wireless telegraph stations or between telegraph offices on land, as the case may be, no matter whether the addressees of such telegrams be in different localities or they be served by different offices of destination. The telegram shall bear the following abbreviated instruction instead of that for an ordinary multiple telegram:

"S M" in the case of Romanised telegrams.

Paragraph 2 of Article 4 is not applicable to the multiple telegram mentioned in the preceding paragraph when it is to be distributed to two or more ship stations, unless every copy of such telegram can be transmitted through the same coast station or

delivered from the same telegraph office on land.

(b) Reply-paid wireless telegrams shall bear the abbreviated instruction for "reply paid," "urgent reply paid," or "collected reply paid" completed by the mention of the prepaid amount. If a prepaid amount is 60 sen in the case of *kana* telegrams, and 75 sen in the case of Romanised telegrams, the mention of the amount is not required.

ART. 11.—Wireless telegrams are subject to the following charge for the operation at a coast station or a ship station in addition to the ordinary telegraph charge. It is provided, however, that the ordinary telegraph charge is not levied on a telegram which is to be transmitted only by wireless telegraphy.

For Government and Ordinary Telegrams :

Coast Charge.—For a *kana* telegram, 20 sen up to fifteen characters ; 5 sen for every additional five characters or less. For a Romanised telegram, 25 sen up to five words ; 5 sen for every additional word.

Ship Charge.—Ditto.

For Press Telegrams :

Coast Charges.—20 sen for every fifty characters or fraction thereof.

Ship Charge.—Ditto.

(a) The following charge is levied in the same way as mentioned in the preceding Article on a supplementary copy of a multiple wireless telegram.

For Government and Ordinary Telegrams :

Coast Charge.—For a *kana* telegram, 10 sen ; for a Romanised telegram, 15 sen.

Ship Charge.—Ditto.

For Press Telegrams :

Coast Charge.—One-half the charge for the original telegram.

Ship Charge.—Ditto.

(b) If, in the case where Paragraph 2 of Article 4 is applied, the amount paid fall insufficient, the deficiency is collected from the addressee. In the case of a multiple telegram the amount to be collected is divided by the number of copies, and the quotient shall be the sum collected from one addressee.

ART. 12.—Wireless telegrams are free from special charge applicable to telegrams handed out of the ordinary hours of duty.

ART. 13.—The following charges for a wireless telegram shall be refunded less the amount which had been appropriated for another charge :—

(1) The charges pertaining to the transmission by wireless telegraphy when not effected.

(2) The charges pertaining to the transmission on telegraph lines when not effected.

ART. 14.—An application for the refund of charges for a wireless telegram handed in at a ship station may be sent in through any telegraph office.

ART. 15.—The term of retention mentioned in Articles 5 and 6 is not reckoned in the period of delay giving rise to refunds.

ART. 16.—Matters not expressly provided for in this Ordinance are subject to the other regulations relating to inland telegrams. Provided that the Regulations relating to Telegrams, Articles 71, 114, 121, 126 to 130, 146 to 148, 148 (vi) to 148 (x), Ordinance No. 46, issued by the Department of Communications in September, 1900, shall not apply.

(a) With the exception of Article 9 to Article 10 (b) and the proviso in Article 16, the regulations in this Ordinance shall apply

in the treatment of connected service between wireless telegraphs and the reciprocal dispatch and receipt of telegrams on land. Provided that, if deemed necessary by the Department of Communications, charges for such service shall be specially fixed.

The treatment of, and special fixing of charges for, wireless telegrams referred to in the preceding clause will be separately notified.

FOREIGN WIRELESS TELEGRAPH REGULATIONS.

C The following supplementary regulations came into operation on July 1st, 1913, and apply to all Japanese possessions:—

ART. 1.—Foreign wireless telegrams are understood to be those which are treated according to the regulations of the London International Radiotelegraphic Convention or to the regulations concerning the radiotelegraphic service concluded between the Government of the Empire and foreign Governments or companies.

ART. 2.—The rates to be charged for foreign messages through Japanese coast and ship stations are as follows:—

(1) Coast station rate, 24 yen (fr. 0.60) per word.

(2) Ship station rate, 16 yen (fr. 0.40) per word.

The coast station rate referred to in the preceding paragraph includes the rate applicable to the transmission on telegraph lines for wireless messages originating in or destined for the Japanese Empire or Southern Manchuria or for ship's stations and the Japanese telegraph service. As regards urgent wireless messages for transmission over land lines, an extra 10 yen (fr. 0.25) will be charged.

ART. 3.—The rates to be charged for foreign radiotelegrams through foreign coast or ship stations will be indicated separately.

ART. 4.—The ordinary rate for foreign wireless messages accepted by a Japanese ship station for transmission through a foreign coast station will be fixed by the owners of the said foreign coast station.

ART. 5.—For the acknowledgment of receipt of foreign wireless messages handed in at a Japanese telegraph office and destined for a ship station and transmitted thereto through a Japanese wireless coast station, the rate for the acknowledgment of receipt of interior telegrams for transmission between Japan and Southern Manchuria will be charged.

ART. 6.—At the request of the receiver, or of the person empowered to receive messages for and on behalf of the receiver, wireless messages may be retransmitted only over Japanese land lines.

ART. 7.—When the Japanese coast station given by the sender of a foreign wireless message destined for a ship cannot transmit the said message it may be transmitted through another Japanese coast station, provided such station is suitable for the purpose. This provision also applies in case the Japanese ship station cannot transmit a foreign wireless message to a Japanese coast station mentioned by the sender and where another Japanese coast station exists and which is capable of performing the duty.

ART. 8.—Japanese ship stations cancel foreign wireless messages when they are not in a position to transmit the same to the corresponding stations.

ART. 9. (i)—Should a foreign wireless message be cancelled in accordance with Article 8, the

sender shall be at once advised and the money paid by him returned without delay.

(ii) Foreign wireless telegrams passing between the Imperial [Japanese] Telegraph Office in Shanghai and Imperial ship stations through the intermediary of Imperial coast stations and, as circumstances require, ship stations may be entered in the Japanese language.

(iii) Article 3, Article 4, clauses i and ii and Article 5, clause 1, of the Wireless Telegraph Regulations, Ordinance No. 16 of the Department of Communications, issued in April, 1908, provide for foreign wireless telegrams in Japanese.

(iv) Reply prepaid foreign wireless telegrams in Japanese must be marked "reply prepaid," followed by the amount paid for reply.

(v) Foreign wireless telegrams dispatched or received at the places announced separately will be transmitted through the intermediary of telegraph offices specially indicated.

(vi) The treatment of foreign wireless telegrams in accordance with the preceding Article is subject to the general regulations relating to foreign telegrams.

ART. 10.—Matters not specially provided for in this Ordinance, as regards Japanese telegrams, foreign telegrams in Japanese, and other items, are subject to the general regulations relating to foreign telegrams.

REGULATIONS RELATING TO PRIVATE WIRELESS TELEGRAPHS.

(Ordinance No. 46, Department of Communications, October 26th, 1915.)

D ART. 1.—The words "disconnected from public communications" in clauses iii and iv Article 2, of the Wireless Telegraph Law mean that the location for fitting up private wireless telegraph apparatus must be outside the boundaries of direct telegram delivery or telephone subscription or on vessels on which no telegraph office is established.

ART. 2.—Wireless telegraphs set up in accordance with clause v, Article 1, of the Wireless Telegraph Law are limited to provision for experiments connected with the science and apparatus of wireless telegraphy.

ART. 3.—Permission will be given to the furnishing of vessels with aerial apparatus and its use for wireless telegraphy by private persons.

ART. 4.—The apparatus and equipment of private wireless telegraphs, except in specially indicated cases, will be required to conform with the following clauses:—

(i) The apparatus must be capable of transmitting eighty *kana* characters or twenty European words per minute.

(ii) The receiving apparatus must be capable of receiving messages transmitted on electric wavelengths of from 100 to 1,800 metres.

(iii) The power supplied to the transmitting circuit corresponding to the distance required to be reached in the daytime must not exceed the following standards (measured at the primary coil of the transformer or at some point corresponding thereto).

Required daytime distance. Electric power.
20 naut. miles, not exceeding ½ kilovolt amps.

100	"	"	"	1	"	"
200	"	"	"	1	"	"
300	"	"	"	2	"	"
400	"	"	"	3	"	"
500	"	"	"	7	"	"

(iv) The electric waves should be pure and suffer but little diminution. The installation must be capable of using waves of such length as may be specifically indicated between 100 and 1,800 metres.

ART. 5.—The establishment and maintenance of private wireless telegraphs required to be installed at certain telegraph offices in accordance with clause iii, Article 2, of the Wireless Telegraph Law will be carried out by the Communications Office having local jurisdiction or a first-class post office dealing with branch administrative business.

Persons establishing private wireless telegraphs under this Article must be responsible for the supply of and expenditure on articles required for their establishment in accordance with details furnished by the Communications Office having local jurisdiction or the first-class post office dealing with branch administrative business, and must further pay expenses of maintenance.

ART. 6.—Persons proposing to establish private wireless telegraphs must append to their application documents inscribed with particulars under the following headings, submitting the whole to the Minister of Communications. Changes occurring under headings (i) to (iv) must similarly be notified.

(i) The object of the installation and grounds for its necessity.

(ii) Site of installation (full address or name of vessel).

(iii) Plan of construction (nature of apparatus, method of mounting, height of electric standards [masts], electric power, distance required to be reached in the daytime, details of supplementary equipment where required).

(iv) Hours open for operation.

(v) Nature of vessel, gross tonnage, owners, course navigated, and regular port of mooring (the principal home port of anchorage should be taken as the regular port of mooring).

(vi) Time required for completion.

The site of installation on vessels under heading (ii) and the plan of construction under heading (iii) should be illustrated by separate drawings.

ART. 7.—Where changes have been made in details under headings (v and vi) of the preceding Article, they must at once be notified to the Minister of Communications. In the case where the regular port of mooring has been changed such change must be notified also to the Communications Office having jurisdiction over, or the first-class post office dealing with branch administrative business at, the former port of mooring.

ART. 8.—When the fitting up and construction of a private wireless telegraph have been completed, the fact must at once be notified to the Minister of Communications.

ART. 9.—When the Minister of Communications has received a report under the preceding Article, he will send inspectors to examine the apparatus and fittings, after which a licence will be granted. Provided that where a special inspection is not deemed necessary a licence may be issued forthwith. If deemed specially desirable by the inspectors under this Article a temporary licence will be issued for the opening of operations by the private wireless telegraph concerned.

ART. 10.—When a private wireless telegraph establishment is to be closed up, a notification

to this effect must be sent to the Minister of Communications seven days earlier. Similar notice must be given in the case of suspension of a private wireless telegraph establishment.

ART. 11.—When a private wireless telegraph establishment has been closed up, the aerials must be removed immediately, and, unless special instructions have been given, apparatus specially pertaining to wireless telegraphy—dynamoes, secondary electric batteries, distributing apparatus, electromotors, motor generators, transformers, electric standards, transmitters, receivers, meters, etc.—must be dismantled and removed within ten days. Where sanction to a private wireless telegraph has been withdrawn the same provision applies.

ART. 12.—When a change is made in the proprietorship of a wireless telegraph installation, a written application for permission, jointly signed with both old and new names, must be submitted to the Minister of Communications.

Where, owing to succession on the decease of the proprietor or other causes, joint signatures cannot be obtained, a certificate to this effect must be appended to the application.

ART. 13.—The length of electric waves and the call signal to be adopted by a private wireless telegraph will be decided by the Minister of Communications.

ART. 14.—When a private wireless telegraph has been sanctioned by the Minister of Communications details of the installation under the following headings will be officially announced. This applies also to changes effected therein :—

(i) Name of person setting up installation.

(ii) Object of installation.

(iii) Site of establishment.

(iv) Call signal.

(v) Ordinary range of distance.

(vi) Method of fitting up.

(vii) Electric wavelength used.

(viii) Hours open for operation.

ART. 15.—Operators of private wireless telegraphs are required to possess the proper qualifications in conformity with the Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs. Provided that exception be made in the case of operators of private wireless telegraphs established in accordance with clause v, Article 2, of the Wireless Telegraph Law, who have received the special sanction of the Minister of Communications.

ART. 16.—Proprietors of private wireless telegraphs must notify the Minister of Communications of all appointments or dismissals of operators in the employ. In the case of appointments, copies of antecedents form, certificate of physical examination and certificate of eligibility awarded on qualifying examination for operators of private wireless telegraphs must be appended.

ART. 17.—Where the Minister of Communications has ascertained that an operator of a private wireless telegraph is incompetent in the performance of his duties he may order the dismissal of such operator.

ART. 18.—A private wireless telegraph establishment shall not begin operations until a licence or temporary licence has been received in accordance with Article 9.

ART. 19.—When a private wireless telegraph establishment has begun operations the Minister of Communications must at once be notified accordingly. Provided that when the installation is one set up in accordance with clause iii, Article 2, of the Wireless Telegraph Law, notification will be required seven days before the opening of operations.

This Article applies also to reopening of operations after notification of suspension has been made in accordance with Article 10.

ART. 20.—The employment of private wireless telegraphs is required to conform with the following paragraphs. Provided that exception be made in the case of communications falling within the purview of Articles 22 to 24.

(i) Only when not causing disturbance to messages sent by the general public or to military communications.

(ii) In the case of installations on vessels, only whilst on voyage.

(iii) In the case of installations set up in conformity with clause v, Article 2, of the Wireless Telegraph Law, only when not causing disturbance to communications from other wireless telegraphs.

ART. 21.—Communications sent by private wireless telegraphs must be in Morse symbols, and the method of transmission, except where special instructions are issued, must conform with the following provisions:—

(i) Before making a call, the receiver must be regulated to the best degree of perception to determine whether a message is already in transmission. A call must not be made until such message, if any, is completed.

(ii) When making a call the "begin communication" signal — • — • — must first be sent, followed by the call signal of the party signalled, repeated three times, then the introductory signal — • — • — followed by own call signal, repeated three times.

(iii) When the signalled party replies, he must send the "begin communication" signal — • — • — followed by the signalling party's call signal repeated three times, then the introductory signal — • — • — followed by his own call signal and the "clear for transmission" signal — • — • —. This applies also in the case of a reply to the call under provision vi.

(iv) When there is no reply from the signalled party to the call made under provision ii, repeat the signals in proper order three times at intervals of two minutes. If there is still no reply, allow fifteen minutes to elapse, then make the call again in the same manner.

(v) When communicating with the signalled party by means of the international shipping signals, continue the call by sending the international shipping signal PRB.

(vi) When wishing to detect a wireless message within own range, use the "Inquiry signal" — • — • — • — • — and make the call provided under (ii).

(vii) When the signalled party replies, begin the required message immediately, and at its ending send the "end communication" signal — • — • — • — and own call signal, followed by the "clear for transmission" signal — • — • — • —.

(viii) When the signalled party has comprehended the message, he must immediately signify its receipt by sending

the signal "understand communication"

— • — • — • — • —
(ix) When mutual messages have been completed, both parties must exchange the "finished" signal — • — • — • — • — and their own call signals.

(x) When in the case of an experimental message sent out by a wireless telegraph established in accordance with clause v, Article 2, of the Wireless Telegraph Law the call signal of another party is not required, repeat own call signal three times and after ascertaining that there is no danger of hindering another message, begin the required communication, and at its ending send the "end communication" signal — • — • — • — • — a down call signal. Provided that such communication must not exceed twenty minutes in duration.

ART. 22.—When dispatching a signal of distress at sea by private wireless telegraph, the preliminary "ship in danger" signal, — • — • — • — • — • — should be repeated at frequent intervals according to circumstances followed by the name of vessel in distress, position, and details of conditions and other matters likely to facilitate rescue. If it is desired to get into touch with a specified wireless telegraph a continued series of the "ship in danger" signal — • — • — • — • — • — should be followed by the call signal of the station signalled.

ART. 23.—When a private wireless telegraph detects the "ship in danger" signal — • — • — • — • — • — accompanying a message of distress at sea, it must suspend all other messages and immediately reply, and report details in the order specified in the last Article to another wireless telegraph situated at the most convenient point for purposes of rescue. Provided that where the message of distress includes a request for specified action before transmitting the report or for specified items to be included therein, such request must be complied with.

In the case of a continued series of the "ship in danger" signal — • — • — • — • — • — being followed by the call signal of a specified station, only in the event of no reply being received therefrom should the responsive steps be taken prescribed in the last paragraph.

ART. 24.—When sending out by private wireless telegraph a necessary warning of danger to navigation, repeat the preliminary navigation alarm signal TTT ten times at short intervals, then transmit necessary details, after which, allowing an interval of ten minutes to elapse, repeat the alarm three times. When a private wireless telegraph detects the navigation alarm signal TTT accompanying a necessary warning of danger to navigation, it must suspend all other messages.

ART. 25.—A private wireless telegraph shall not be prevented, in cases of messages coming under the provisions of the last three Articles only, from exceeding the prescribed limit of electric power or wavelength used. Provided that, immediately after such use, the prescribed limits shall be reverted to.

ART. 26.—When a telegraph office has sent out by wireless telegraphy the private "suspend communication" signal — • — • — • — • — all private wireless telegraph messages within such office's range of distance must be suspended until the private "renew communication" signal — • — • — • — • — • — is issued.

ART. 27.—A private wireless telegraph shall not be prevented, in the cases referred to below, from operating outside the objects for which it was established.

(i) When deemed necessary to exchange messages with other wireless telegraphs concerning communications coming within the purview of Articles 22 to 24.

(ii) When deemed necessary to exchange messages with other wireless telegraphs in connection with meteorological and time signals or the adjustment of apparatus.

(iii) When rendered necessary to communicate with a telegraph office equipped with wireless telegraph apparatus, following instructions issued by such office.

(iv) When deemed necessary to exchange messages with military wireless telegraphs to meet the requirements of military communications.

ART. 28.—When a private wireless telegraph has received a request from another wireless telegraph to exchange messages for the purpose of adjusting apparatus, it shall respond thereto, provided there is no danger of obstruction.

ART. 29.—The Minister of Communications shall specially instruct the Wireless Telegraph Inspection Bureau to test a private wireless telegraph with a view to ascertaining whether it is properly employed and whether its communications are in order.

ART. 30.—When sending instructions to a private wireless telegraph relating to its communications, the Wireless Telegraph Inspection Bureau will prefix to its call signal the wireless telegraph inspecting signal **•••••** in order to distinguish its message from general communications.

ART. 31.—Where an order is sent direct to an operator relating to the restriction or suspension of operations by the private wireless telegraph operated by him or the removal of its apparatus and accessories, the person responsible for the installation will be separately notified.

ART. 32.—When a vessel with a private wireless telegraph on board comes within the wireless telegraph range of a telegraph office it must briefly report to such office its direction and distance therefrom, together with the direction in which the vessel is moving. When about to withdraw from the range of such office a similar report must be sent.

ART. 33.—The person responsible for a private wireless telegraph must report to the Minister of Communications, at the same time giving details, on all circumstances falling under the following headings:—

(i) When special restrictions have been imposed on the equipment and operation of the wireless telegraph concerned in foreign waters. Provided that exception be made where such restriction has been officially announced.

(ii) When messages have been sent in accordance with Articles 22–24.

(iii) When cases of contravention of the Wireless Telegraph Law or the Regulations connected therewith on the part of a private or foreign wireless telegraph have been detected.

(iv) When matters have arisen calling for special attention in regard to the results of wireless telegraphy or other features.

ART. 34.—The person responsible for a private wireless telegraph must keep a journal and

cause the operator to record therein the items coming under the following headings:—

(i) Time of beginning and end of messages, and wireless station signalled.

(ii) Nature of message.

(iii) The circumstances coming under Articles 27 and 33, and the steps taken in accordance therewith.

(iv) In the case of private wireless telegraphs established in accordance with Clause v, Article 2, of the Wireless Telegraph Law, the results of experiments.

(v) In addition to the matters under the above headings, references for future use. Communication journals as prescribed in this Article must be preserved for fifteen months, counting from the month following that in which they are completed.

ART. 35.—The person responsible for a private wireless telegraph must affix in his operating room, where they can easily be seen, his certificate, together with copies of the penal clauses of the Wireless Telegraph Law and a list of the essential objects for which the installation was established.

ART. 36.—The Minister of Communications will from time to time specially send officials to examine reports, and documents connected therewith, on the apparatus mounting and operations of private wireless telegraphs, in such cases the officials concerned will carry proof of their competency.

ART. 37.—Documents to be sent in under the provisions of Articles 7, 8, 10 and 19 may be replaced by telegrams.

ART. 38.—Documents to be submitted under this Ordinance to the Minister of Communications, with the exception of those coming under the preceding Article, must all be passed through the Communications Office having jurisdiction over, or the first-class post office dealing with branch administrative business at, the place of a land installation or the regular port of mooring of a vessel having an installation.

Supplementary Regulations.

ART. 39.—The provisions of Articles 1 to 3, 5 to 14, 18 to 20, 22 to 38, apply to private wireless telephones, and the provisions of Articles 22 to 24, 26, 29 to 31 and 36 apply to wireless telegraphs or telephones installed on foreign vessels.

ART. 40.—This Ordinance comes into force on November 1st, 1915.

REGULATIONS RELATING TO QUALIFYING EXAMINATIONS FOR OPERATORS OF PRIVATE WIRELESS TELEGRAPHS.

E (Ordinance No. 48, of the Department of Communications, October 26th, 1915.)

ART. 1.—Persons aged seventeen or above qualifying for posts as operators of private wireless telegraphs will be examined and approved according to the following classification:—

Class I.—Persons capable of operating private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2.

Class II.—Persons capable of acting as assistant operators of private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2 (except those set up under clause iii) and of private wireless telegraphs set up under the provisions of clause iii of the same Article.

Class III.—Persons capable of acting as assistant operators of private wireless telegraphs set up under the provisions of the Wireless Telegraph Law, Article 2, clause v, and of private wireless telegraphs set up under the provisions of any one of the clauses of the same Article.

Art. 2.—Examinations will be carried out by the Qualifying Examination Committee for Operators of Private Wireless Telegraphs appointed by the Minister of Communications. The subjects for examination are as follows:—

(1) Wireless Telegraphy: Theory (for Class I only), adjustment and use of apparatus (for Classes I and II only).

(2) Practical Electric Telegraphy: Transmission of a message in Japanese and a European language and reception of a message by sounder. Standard of speed to be—for Class I, eighty *katakana* characters (syllables) or twenty European words per minute; and for Classes II and III, fifty *katakana* characters (syllables) or twelve European words per minute.

(3) Wireless Telegraph Laws and Regulations: General Laws and Ordinances relating to wireless telegraphs (for Classes I and II only); Laws and Ordinances relating to private wireless telegraphs (for Class III only).

(4) English language: Rudiments (for Classes I and II only).

Art. 3.—The Minister of Communications will award certificates of eligibility (form No. 1) to successful candidates in the examination.

Art. 4.—Persons who have had not less than two years' practical experience in the public telegraph or wireless telegraph service or in military wireless telegraphy may be granted certificates of eligibility according to the following classification without undergoing examination, on review by the Qualifying Examination Committee for Operators of Private Wireless Telegraphs.

(1) Persons engaged in the public wireless telegraph service—for Class I or lower.

(2) Persons engaged in military wireless telegraphy—for Class II or lower.

(3) Persons engaged in the public telegraph service—for Class III.

These provisions apply also in the case of persons holding second or third-class certificates of eligibility according to the following classification:

(1) Persons holding second-class certificates of eligibility who have been engaged for not less than two years as assistant operators of private wireless telegraphs established in accordance with the Wireless Telegraph Law, Article 2, clause iii—for Class I.

(2) Persons holding third-class certificates of eligibility who have been engaged for not less than two years as assistant operators of private wireless telegraphs—for Class II.

Art. 5.—Persons holding a certificate of study for completion of training in wireless telegraphy, practical electric telegraphy, and Wireless Telegraph Laws, and Regulations, in accordance with the classifications determined by the Ministry of Communications, with the object of engaging in wireless telegraphy, may be granted certificates of eligibility, for Class I or lower, on review.

Art. 6.—Examinations will be held annually. Date, place and other details thereof will be announced in the *Official Gazette*. Provided that if deemed necessary by the Minister of Communications extra examinations may be held at special times.

Reviews by the examiners will take place according to circumstances.

Art. 7.—Candidates for examination must submit to the Minister of Communications before the appointed date an application in writing (Form No. 2), appending thereto a statement of antecedents (Form No. 3), an abstract of the Census Register, and a photograph.

Art. 8.—Candidates for examination must pay an examination fee of two yen in Class I and one yen in Classes II and III, affixing to the application form a revenue stamp for the amount.

Fees already paid for examination cannot be refunded to candidates failing to pass the examination or to those disqualified under the provisions of Article 9.

Art. 9.—Where the Qualifying Examination Committee for Operators of Private Wireless Telegraphs have detected false statements in a form of antecedents or improper behaviour during examination, they will disqualify the candidate concerned.

Where the facts of a case coming under the provision of this Article are discovered after the candidate has passed the examination, his certificate of eligibility will be invalidated.

Art. 10.—The names of successful candidates will be announced in the *Official Gazette*.

Art. 11.—Where the holder of a certificate of eligibility has changed his name or lost or damaged his certificate, he may apply to the Minister of Communications for a revision or renewal thereof.

Applicants under this provision must pay a fee of thirty sen for revision or renewal of certificate affixing to the letter of application a revenue stamp for the amount.

Additional Regulation.

This Ordinance comes into force on November 1st, 1915.

(Form No. 1.)

Certificate of Eligibility awarded on Qualifying Examination for Operators of Private Wireless Telegraphs.

Name
Address
Date of birth
Eligible for Class No.

This is to certify that the above-named is qualified in the class designated in accordance with the Regulations relating to Qualifying Examinations for Operators of Private Wireless Telegraphs.

Name (seal)
President of Qualifying Examination Committee for Operators of Private Wireless Telegraphs.
Date

The certification of the President of the Qualifying Examination Committee for Operators of Private Wireless Telegraphs is sanctioned and a certificate of eligibility hereby granted.

(This certificate of eligibility falls within the category of Class A (B) certificates under the provisions of the Regulations relating to Business annexed to the International Wireless Telegraph Convention of London, and the holder of this certificate declares his acceptance of the obligation strictly to preserve the secrecy or communications under the whole of the Regulations.)

(Seal) Minister of Communications.
Date

Notes :—

- (1) On the back, in the cases of Classes I and II, appears a translation in a foreign language.
(2) The paragraph in parentheses appears in the cases of Classes I and II.

(Form No. 2.)

Memorandum (on Mino paper).
Form of Application for Qualifying Examination for Operators of Private Wireless Telegraphs.

Affix Revenue Stamp here.	Name of applicant
	Address
	Date of birth
	Class qualifying for : No.

I am desirous of undergoing
{ examination to } qualify for the
{ review by examiners to }
above Class in accordance with
{ the provisions of the } Regulations relating
{ Article 4 (or 5) of the }
to Qualifying Examinations for Operators of
Private Wireless Telegraphs, and append the
documents required by Article 7 of the same
Regulations.

Name (seal)

Present address

Date

To the Minister of Communications.

(Form No. 3.)

Memorandum (on Mino paper).
Statement of Antecedents.

Name

Social status and domicile

Date of birth

Education :—

School Section Date of entry

School Section Date of completion of studies, graduation, or leaving school (abstract of graduation certificate or certificate of study appended).

Occupation :—

Government office or private firm (fill in name)..... Date of entry.... Occupation followed (references from the Government office [or firm] appended).....

Awards or penalties :—

Description Date

The above is a correct statement.

Name (seal)

Present address

Date

Note.—A detailed statement of matters relating to telegraphy or wireless telegraphy is required. Attention is directed to the following points :

- (1) The applicant's name must be inscribed on the photograph.
(2) The revenue stamp must not be cancelled.

JUGO-SLAVIA

THIS country was formed by the fusion, under the terms of the European Peace Treaty, of Servia, Montenegro, and the provinces of Bosnia and Herzegovina, which were annexed by Austria in 1908.



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Conditions are too unsettled in this territory for us to be able to obtain much information in regard to radiotelegraphy therein, but the annexed map will show the position of the existing wireless stations, and we hope that by the time our next volume is issued that some further particulars concerning the organisation and administration of wireless telegraphy will be available.

KENYALAND COLONY AND EAST AFRICAN PROTECTORATE

THE territory covered under the above title extends from the Umba to the Juba River, and inland as far as the borders of Uganda; certain mainland dominions of the Sultan of Zanzibar (these having been leased to Great Britain for an annual rent), and the erstwhile colony of German East Africa.

The Administration is conducted by a Governor and Commander-in-Chief, assisted by an Executive and a Legislative Council.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. J. Gosling	Postmaster-General	Nairobi.
Mr. L. E. Caine	Chief Telegraph Engineer	Do
Mr. H. J. W. Ridley	Assistant Telegraph Engineer	Do.
Mr. J. K. Creighton	Telegraph Engineer	Do.
Mr. G. F. Pall	Wireless Telegraph Engineer	Mombasa
Mr. A. Kane	Do. do.	Do.
Mr. J. Gornall	Do. Do.	Do.
Mr. G. E. Hughes	Do. Do.	Do.
Mr. F. Wrigglesworth	Do. Do.	Do.

ORGANISATION.

At present there are two radio stations open for public traffic in this territory—one at Mombasa and the other at Kismayu, in Jubaland, whilst the construction of a third station is contemplated.

The Mombasa station is equipped with a 5 kilowatt synchronised spark, with a spark frequency of 600 per second. The note emitted is pure musical and somewhat high. This plant is only used when the state of the atmosphere will not permit the small plant to be used, the particulars of which are as follows:—

A 1½ kilowatt synchronous direct-coupled plant capable of transmitting to ships a distance of 350 nautical miles. The usual frequency of the discharger is 750 per second, which has been found to give the best results in this locality.

The Kismayu station is equipped with a 3 kilowatt synchronous spark set having a frequency of 600 per second.

A radio service is maintained with Mombasa as a means of communication with Jubaland.

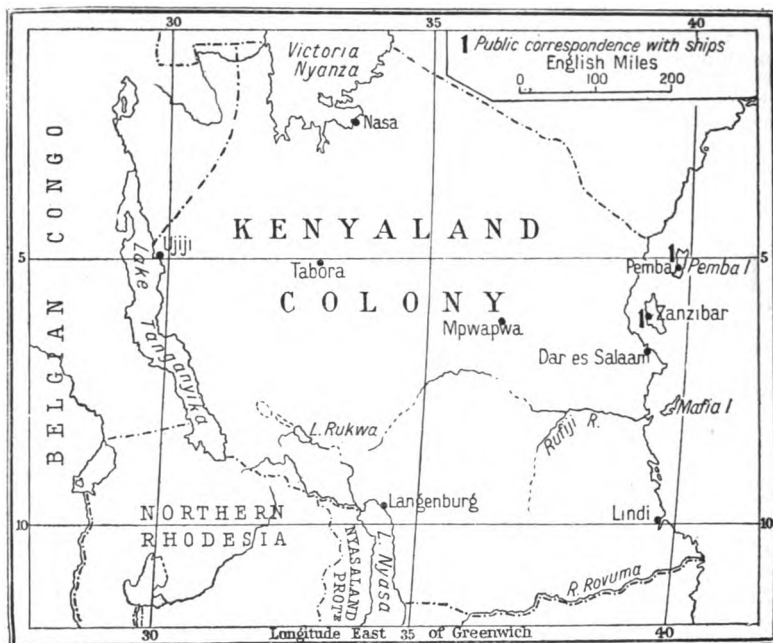
At present there are no private or experimental stations in the territory, neither have any licences been issued for ship stations registered therein. An aerodrome is in contemplation for Kisumu on the shores of Lake Victoria Nyanza.

ADMINISTRATION.

Radiotelegraphy is administered under the following:—

A—Wireless Telegraphy Ordinance, 1913.

B—Experimental Licence issued thereunder.



WIRELESS TELEGRAPHY ORDINANCE, 1913.

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. The expression "wireless telegraphy" means any system of communication by telegraph as defined by the Indian Telegraph Act, 1883, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate.

4. (1) No person shall establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless

telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand and five hundred rupees or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor may make regulations for all or any of the following matters:—

(i) for prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(ii) for prescribing the fees payable on the grant of any licence;

(iii) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Protectorate shall be worked so as to prevent interference with naval signalling or the working of any

wireless telegraph station lawfully established, installed, or worked in the Protectorate or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(iv) for prohibiting, except with the special or general permission of the Postmaster-General of the Protectorate, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Protectorate;

(v) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Protectorate, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all classes or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii) (iv) and (v) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy

a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

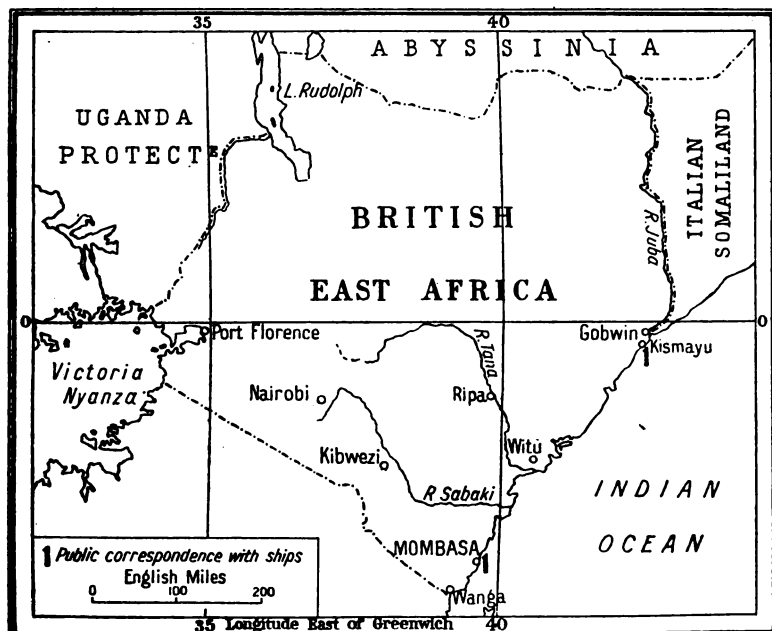
8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of seven hundred and fifty rupees.

(2) All convictions, forfeitures, and fines under this Ordinance or any Regulations thereunder may be had and recovered before a Magistrate of the first class, and every such Magistrate shall have jurisdiction to pass any sentence authorised by this Ordinance on any European or other non-Native convicted of an offence against this Ordinance notwithstanding anything in any Ordinance or law limiting the jurisdiction of such Magistrate over Europeans and non-Natives.

9. The Wireless Telegraph Ordinance, 1908, is hereby repealed: Provided however—

(1) Every licence granted under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been granted under this Ordinance.

(2) All Regulations made under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been made under this Ordinance and shall continue in force until other provision is made.



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LICENCE.

B In exercise of the powers conferred upon me by Section 7 of the Wireless Telegraphy Ordinance, 1913, I, Edward Northey, Major-General of His Majesty's Forces, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Companion of the Most Honourable Order of the Bath, Governor and Commander-in-Chief of the Colony of Kenya and the East African Protectorate, do hereby license and authorise residing at to conduct experiments in wireless telegraphy and for such purpose to import Wireless Telegraph apparatus and instal the same at such places as the Postmaster-General shall approve

subject to the conditions and restrictions following, that is to say:—

1. All apparatus utilised pursuant to the provisions of this licence shall be used solely for the purpose of scientific study in wireless telegraphy and in no case shall the licensee instal apparatus capable of being used for the purpose of sending wireless signals, or use the receiving apparatus for the purpose of receiving either private messages or for any commercial telegraph traffic whatsoever.

2. This licence shall remain in full force and operation for
date hereof. from

Given under my hand at Nairobi this
day of 1920.

Governor and Commander-in-Chief.

KOREA

(See JAPAN.)

KWANTUNG

(See JAPAN.)

LADRONE ISLANDS

(See map on p. 139.)

LATVIA

(See map on p. 389.)

THIS State, alternatively known under the appellation Lettland, has only recently gained its independence, having been formed out of the erstwhile Russian Empire. The country constitutes that part of the territory lying immediately around the Gulf of Riga.

Owing to the political situation it has been impossible to obtain any particulars in regard to the organisation and administration of wireless telegraphy in that country, but it has been ascertained that there are two wireless stations working. These are situated respectively at Riga and Libau.

LEEWARD ISLANDS

THE Leeward Islands consist of the five Presidencies of: (1) Antigua with Barbuda and Redonda; (2) St. Kitts and Nevis with Anguilla; (3) Dominica; (4) Montserrat; and (5) The Virgin Islands with Sombrero. The Colony is under one Governor who resides at Antigua. The Presidencies of St. Kitts and Dominica are under Administrators and the Presidencies of Montserrat and the Virgin Islands under Commissioners, the Administrators and Commissioners being subject to the instructions of the Governor. The administrative centre and the residence of the Governor-in-Chief is St. John's, Antigua, lying in 17° 6' N. latitude, 61° 45' W. longitude.

ADMINISTRATION.

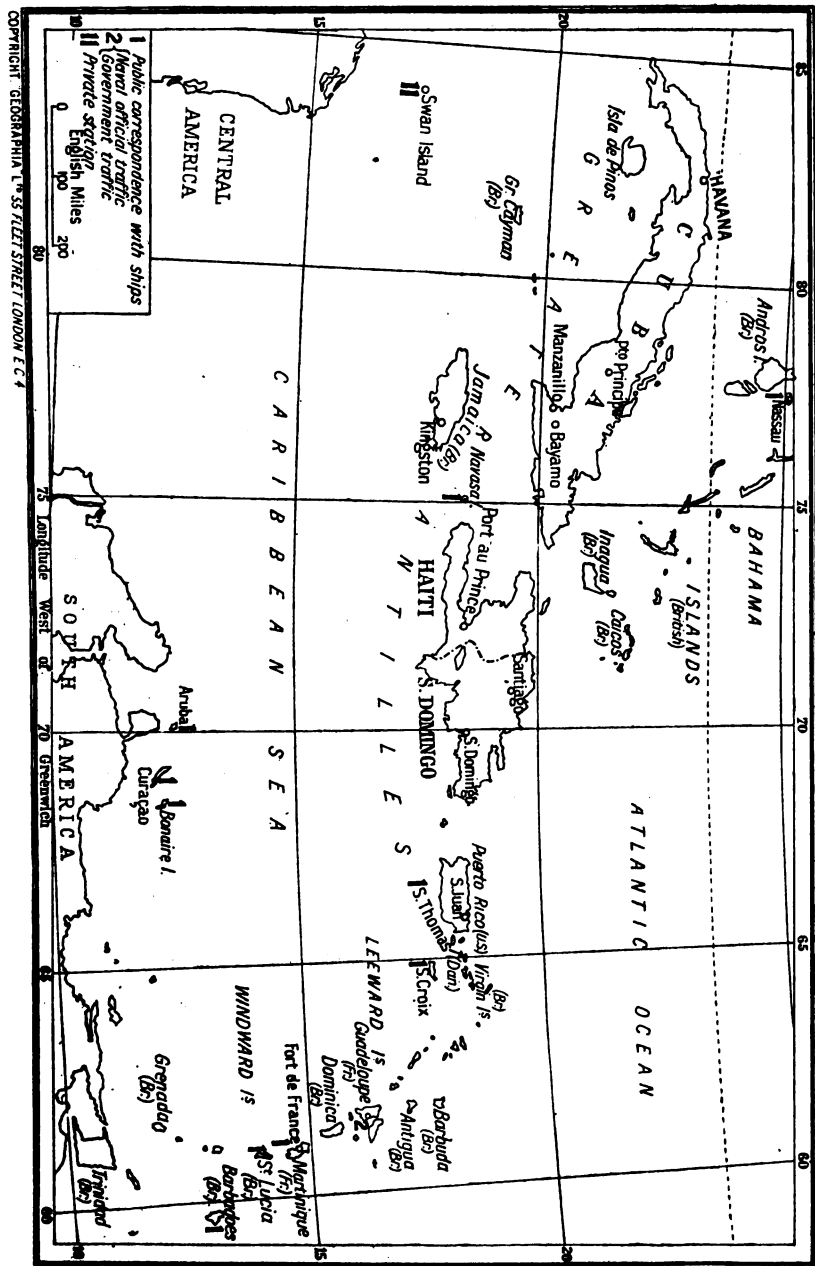
No wireless stations exist, but wireless telegraphy would be administered under:—

A—Ordinance No. 11, 1913.

B—Regulations made thereunder in 1913, and

C—Further Regulations dated 28th August, 1917.

Similar legislation is in force in the other islands under the same administration.



ANTIGUA, NO. 11 OF 1913.

A An Ordinance to consolidate and amend the law relating to wireless telegraphy.

Be it ordained by the Governor and Legislative Council of Antigua as follows :

1. This Ordinance may be cited for all purposes as "The Wireless Telegraphy Consolidation Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received ; Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor-in-Council.

(2) Every such licence shall be in such form and for such period as the Governor-in-Council may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. No person shall work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Presidency, otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor-in-Council may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor-in-Council an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in territorial waters of the Presidency shall be subject to such further regulations as may be made by the Governor-in-Council from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place, or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Chief Inspector of Police and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place or ship and to seize

any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person guilty of an offence against any provisions of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings under this Ordinance shall be taken on the complaint of the Chief Inspector of Police or of any person thereto authorised by him in writing.

8. Ordinance No. 12 of 1903 entitled "An Ordinance to regulate the establishment of Wireless Telegraphy" and Ordinance No. 7 of 1913 entitled "An Ordinance to amend the Wireless Telegraphy Ordinance, 1903," are hereby repealed.

Passed the Legislative Council the 14th day of October, 1913.

Dated at Antigua the 23rd day of October, 1913, in the fourth year of His Majesty's reign.

SCHEDULE—SECTION 5 (2).

REGULATIONS.

B 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Presidency shall be worked in such a way as not to interfere with

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed or worked in the Presidency or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Presidency except with the special or general permission of the Governor-in-Council.

4. For the purpose of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS.

MADE BY THE GOVERNOR-IN-COUNCIL.

C Whereas it is provided by section 5 (3) of the Wireless Telegraphy Consolidation Ordinance, 1913, that if at any time, in the opinion of the Governor-in-Council, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the Presidency shall be subject to such further regulations as may be made by the Governor-in-Council from time to time; and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas in my opinion such emergency as aforesaid has arisen :

Now I do hereby rescind the further Regulations made under the said Ordinance on the 8th day of September, 1914, and make the following Regulations, namely :—

1. The radiotelegraph stations on board ships (other than ships requisitioned by His Majesty's Government) shall not be worked whilst such ships are within a harbour of the Presidency and for the proper enforcement of the above.

(a) Ships of British register in harbours of the Presidency must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being

suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show that they are properly disconnected.

(b) Ships of foreign register in a harbour of the Presidency must, subject to the provisions of the following sub-sections (c) take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

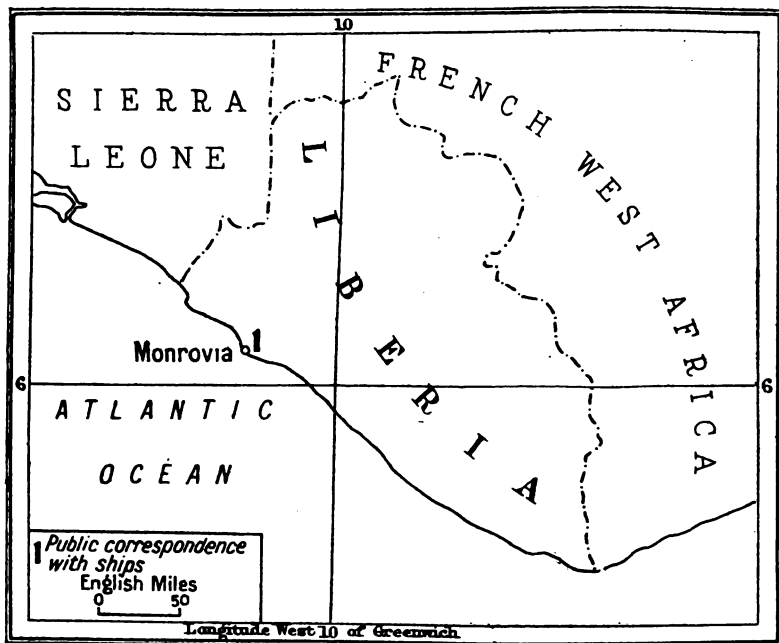
(c) Ships of foreign register remaining in the harbour of the Presidency for less than twelve hours may at the discretion of the Governor be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of sub-section (a) of this Regulation.

2. The Governor may at his discretion direct that the operating room of any ship (other than a ship requisitioned by His Majesty's Government) in a harbour of the Presidency be sealed or order any other steps to be taken affecting the radiotelegraph station on board any such ship.

3. Every person failing to obey and conform with the provisions of these Regulations or with any directions given by the Governor under the same shall be guilty of an offence and shall be liable on summary conviction to the penalties under the Ordinance provided.

Made by the Governor-in-Council, under section 5 (3) of the Wireless Telegraphy Consolidation Ordinance, 1913, this 28th day of August, 1917.

LIBERIA



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THE only independent "black" republic in the Old World, owes its inception (in 1847) to an effort on the part of American and European slave emancipators to found a country for freed negro slaves in the continent which formed the original home of the race. It lies on the west coast of Africa, approximately between 5° and 10° N. latitude and 7° and 11° W. longitude, possessing about 350 miles of coast line. The executive authority is vested in a President, a Vice-President, and a Council of six Ministers, and the legislative power in a Parliament of two Houses, known respectively as the Senate and House of Representatives.

Wireless telegraphy is represented by a station situated at Monrovia, under the jurisdiction of the French Government, which is open for public correspondence with ships.

LUXEMBOURG

(See map on p. 229.)

THIS small Grand Duchy lies roughly about 150 miles from the nearest sea coast, and is bounded on the east by Germany, on the south by France, and on the west by Belgium. Formerly (from 1815 to 1866) it formed part of the now dissolved Germanic Confederation, but under the terms of the Treaty of London, dated 11th May, 1867, it is declared neutral territory, and its integrity and independence guaranteed. The country is governed by a Chamber of Deputies of 53 members, elected for six years, with half renewed every three years. Its total area is about 1,000 square miles, and it possesses a population of about 260,000.

ORGANISATION.

A receiving wireless telegraph station will be erected by the State at the capital city of Luxembourg, with the object of receiving daily French Official Time and Meteorological information.

ADMINISTRATION.

No law fixing conditions under which wireless apparatus may be installed is in existence, although a certain number of amateurs are in possession of receiving apparatus.

The Grand Duchy of Luxembourg has not adhered to the London Radiotelegraphic Convention; it has, however, made a declaration to the Berne Bureau in accordance with Article 48 of that Convention.

MADAGASCAR

(See FRANCE.)

MALAYA

(See map on p. 139.)

Comprising (1) The Federated Malay States;
(2) Malay States not included in the Federation.

(1) Federated States.

THE first division under which the component parts of Malaya are grouped consists of the Federated States. They lie on the mainland of the Malay Peninsula, and are closely connected with the Straits Settlements. They comprise the States of Perak, Selangor, Negri Sembilan, and Pahang, which have by a Treaty dated 1895 renewed their arrangements with the British Government. They are administered under the advice of a Chief Secretary with residents in each State, subject to the instructions of the High Commissioner, who is also Governor of the Straits Settlements, and resides at

Singapore. The Chief Secretary to the Government is located at Kuala Lumpur. Their total area amounts to 27,506 square miles.

There are two wireless stations open for public service with ships and one for Government traffic only.

ADMINISTRATION.

Wireless telegraphy is regulated by:—

A—Enactment No. 7 of 1913, and

B—Rules under the above Enactment.

The text of both the enactment and the rules made under its provisions will be found below.

ENACTMENT NO. 7 OF 1913.

A An Enactment to make better provision for the regulation of Wireless Telegraphy.

July 30th, 1913.

It is hereby enacted by the Rulers of the Federated Malay States in Council as follows:—

1. (1) This enactment may be cited as "The Wireless Telegraphy Enactment, 1913," and shall come into force upon the publication thereof in the *Gazette*.

(2) The Enactments specified in the schedule are amended by deleting from the interpretation of "Telegraph" in section 2 of each of the said Enactments the words "whether worked with or without lines of wires."

2. (1) In this Enactment the expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraphs Enactments, 1905," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received;

The expression "locally owned ship" means a ship owned wholly by the Government of the Federated Malay States or of any of them or by subjects of any of the rulers of the said States or by bodies corporate established under and subject to the laws of the said States or of any of them and having their principal place of business within the said States or by any person residing within the said States.

(2) Nothing in this Enactment shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Chief Secretary to Government may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Federated Malay States or on board any locally owned ship.

4. (1) No person shall establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place in the Federated Malay States or on board any locally owned ship except under and in accordance with a licence granted in that behalf by the Chief Secretary to Government.

(2) Every such licence shall be in such form and for such period as the Chief Secretary to Government may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Chief Secretary to Government shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be liable to a fine not exceeding

one thousand dollars or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Enactment except with the previous sanction of the Public Prosecutor.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Chief Secretary to Government may make rules for all or any of the following matters:—

(a) for prescribing the form and manner in which applications for licences under this Enactment are to be made;

(b) for prescribing the fees payable on the grant of any licence;

(c) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, in the waters of the Federated Malay States shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the Federated Malay States or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(d) for prohibiting except with the special or general permission of the Director of Posts and Telegraphs, Federated Malay States, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, whilst such ship is in any of the harbours of the Federated Malay States;

(e) for prohibiting or regulating, in case at any time in the opinion of the Chief Secretary to Government an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether locally owned ships, British or foreign ships, in the waters of the Federated Malay States, the use of wireless telegraphy on board such ships while in such waters

by such further rules as the Chief Secretary to Government may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) No rules made in respect of the matters described in paragraphs (c), (d) and (e) of sub-section (1) shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Chief Secretary to Government that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Chief Secretary to Government may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Enactment or of any rule made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Enactment and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding five hundred dollars.

(2) All convictions, forfeitures and fines under this Enactment or any rules made thereunder may be had and recovered before the Court of a Magistrate of the First Class.

SCHEDULE.

State.	No. and year.	Short title.
Perak ..	6 of 1905	The Telegraphs Enactment, 1905
Selangor ..	9 "	" "
Negri Sembilan ..	7 "	" "
Pahang ..	8 "	" "

RULES.

UNDER "THE WIRELESS TELEGRAPHY ENACTMENT, 1913."

B In exercise of the powers vested in him by section 6 of "The Wireless Telegraphy Enactment, 1913," the Chief Secretary to Government has made the following rules:—

1. All apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, in the waters of the Federated Malay States shall be worked in such a way as not to interfere with (a) naval signalling or (b) the working of any wireless telegraph station lawfully established installed or worked in the Federated Malay

States or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. (i.) No apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship, a British or a foreign ship, shall be worked or used whilst such ship is in any of the harbours of the Federated Malay States.

(ii.) To ensure the proper enforcement of paragraph (i.) of this rule—

(a) Locally owned ships and British ships in harbours of the Federated Malay States shall completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show that they are properly disconnected.

(b) Foreign ships in harbours of the Federated Malay States shall take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus; provided that foreign ships remaining in a harbour of the Federated Malay States for less than twelve hours may, at the discretion of the Harbour Master or other competent local authority, be permitted to leave their aerials up, if the same are disconnected in the manner described in the last preceding clause;

(c) The operating room of any locally owned or British or foreign ship shall, in any case where the Harbour Master or other competent local authority so directs, be sealed up and kept sealed up while such ship is in a harbour of the Federated Malay States, and such other steps may be taken as to the Harbour Master or other competent local authority seem expedient.

3. If at any time, in the opinion of the Chief Secretary to Government, an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships, whether locally owned ships, British or foreign ships, while in the waters of the Federated Malay States shall be subject to such further rules as may be made by the Chief Secretary to Government from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Expressions defined in "The Wireless Telegraphy Enactment, 1913," have in these rules the meanings thereby assigned to them.

(2) Non-Federated States.

These comprise Johore, Kedah, Perlis, Kelantan and Trengganu. The relations of Johore with Great Britain are defined in the Treaty of 1885, amended by an agreement dated May 12th, 1914, whereby the Sultan exacts and acts upon the advice of a British officer called his General Adviser. With regard to the other four States, rights of suzerainty, administration and control were transferred by Siam to Great Britain under a Treaty dated March 10th, 1909.

At present there are no wireless stations in these States and consequently no radiotelegraphic enactments.

MALTA

THIS island, $17\frac{1}{2}$ miles long by $8\frac{1}{2}$ miles broad, forms the headquarters of the British Mediterranean Fleet and the principal coaling station for merchant vessels, as well as the Navy, in the Mediterranean. The language of the people is a corrupt dialect of Arabic. The Knights of St. John, who possessed the island from 1530 to 1798, raised the stupendous fortifications which rendered Malta so long militarily formidable. The island was finally recognised as a British dependency by the Congress of Vienna in 1814, and is ruled by a Governor, assisted by an Executive Council and a "Council of Government." In 1920 a partial measure of home rule was adopted.

CONTROL AND ORGANISATION.

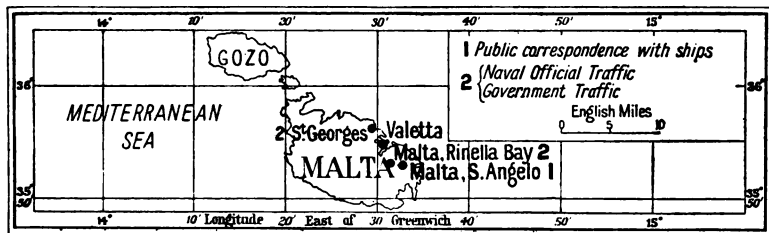
The administration of wireless telegraphy in Malta and its dependencies is under Naval control. There are three stations, one of which is open for public service to ships.

ADMINISTRATION.

Wireless telegraphy in the Colony is administered under the provisions of Telegraph Ordinance No. I of 1904, as amended by Telegraph Ordinance No. III of 1909, but wireless telegraphy is not specifically mentioned in either, and they are therefore not printed here. Regulations under these Ordinances have been made by His Excellency the Governor and are reprinted in full below.

A—Government Notice No. 258 of December 24th, 1909.

B—Section 28, Malta Defence Regulations.



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GOVERNMENT NOTICE, No. 258.

A It is hereby notified for general information, that His Excellency the Governor, in exercise of the powers vested in him by Article 41 of Ordinance No. I of 1904, as amended by Ordinance No. III of 1909, has been pleased to make the following regulations respecting the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in the territorial waters of these Islands.

By command, E. P. S. ROUPELL,
Acting Lieutenant-Governor and Chief Secretary to Government.

Lieut.-Governor's Office, The Palace, Valetta,
December 24th, 1909.

REGULATIONS RESPECTING THE USE OF WIRELESS TELEGRAPH APPARATUS ON MERCHANT SHIPS, WHETHER BRITISH OR FOREIGN, WHILE IN THE TERRITORIAL WATERS OF MALTA AND ITS DEPENDENCIES.

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of these Islands shall be worked in such a way as not to interfere with—

(a) Naval signalling; or

(b) the working of any wireless telegraph station lawfully established, installed or worked in these Islands or the territorial waters thereof;

and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of these Islands, except with the special or general permission in writing of the Lieutenant-Governor.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

SECTION 28, MALTA DEFENCE REGULATIONS.

B PROHIBITION AGAINST POSSESSION OF WIRELESS TELEGRAPHIC APPARATUS, ETC.

No person shall, without the written permission of the Governor, make, buy, sell, or have in his possession or under his control any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus; and no person shall sell or give any such apparatus to any person who has not obtained such permission as aforesaid, and any person having in his possession or under his control any such apparatus, whether with or without the permission of the Governor, shall on demand deliver the apparatus to the Governor, or as he may direct; and if any person contravenes the provisions of this regulation he shall be guilty of an offence against these regulations.

Where it appears to the Governor that there

are reasons to suspect that any person having in his possession any apparatus for sending or receiving messages by telegraphy, wireless telegraphy, telephony or other electrical or mechanical means is using or about to use the same for any purpose prejudicial to the public safety or the defence of these Islands, he may, by order, prohibit that person from having any such apparatus in his possession, and may take such steps as are necessary for enforcing the order, and if that person subsequently has in his possession any apparatus in contravention of the order, he shall be guilty of an offence against these regulations.

For the purpose of this regulation, any apparatus ordinarily used as a distinctive component part of apparatus for the sending or receiving of messages by wireless telegraphy shall be deemed to be intended to be so used unless the contrary is proved.

Any person possessing private telephone installations or any apparatus capable of being used for transmitting telephone messages shall give notice to the Superintendent of Police of any such installation or apparatus, and if he fails to do so he shall be guilty of a summary offence against these regulations.

MARIANNE ISLANDS

(See map on p. 139.)

MARSHALL ISLANDS

(See map on p. 356.)

MARTINIQUE

(See FRANCE.)

MAURITIUS

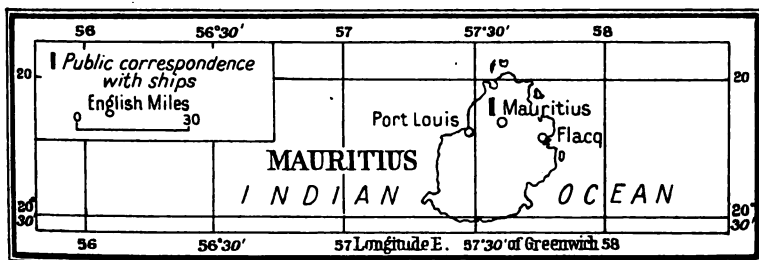
MAURITIUS lies in the Indian Ocean, 500 miles east of Madagascar, and comprises a total area of about 720 square miles. It possesses but one wireless installation, and that is open to public service with ships.

The Colony was formerly ceded to Great Britain by the Treaty of Paris of 1814. Under letters patent of 1885, 1901, 1904, and 1912 partially representative institutions have been granted. The Administration of the Colony and its dependencies is vested in a Governor, assisted by an Executive Council and a Council of Government.

ADMINISTRATION.

The legislation affecting Wireless Telegraphy in Mauritius was originated by an Ordinance (No. 33) issued in 1903 investing the Governor with certain administrative powers. This was amended by the "Wireless Telegraphy" (Amendment) Ordinance (No. 25) of 1912. These have since been consolidated by Ordinance No. 11 of 1913, and three sets of Regulations have been framed thereunder, as follows:—

- A**—Ordinance No. 11 of August 22nd, 1913 (to Consolidate the Laws on Wireless Telegraphy).
- B**—Regulations framed under Ordinance No. 11 of 1913 (Art. 4) (August 22nd, 1913).
- C**—Additional Regulations respecting the transmission of messages by Wireless Telegraphy.
- D**—Regulations governing the transmission of messages by Wireless Telegraphy through Rose Belle Station to and from Merchant Ships at sea.



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ORDINANCE No. 11.

August 22nd, 1913.

A Be it Enacted by the Governor, with the advice and consent of the Council of Government, as follows:—

1. *Definition of "Wireless Telegraphy."*—In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received; Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *Licence for "Wireless Telegraphy."*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

3. *Apparatus aboard ships.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

4. *Regulations.*—(1) The Governor in Executive Council may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrant.*—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that

behalf or contrary to the provisions of any regulations made under this Ordinance or for any licence granted under this Ordinance he may grant a search warrant to any police officer or any person appointed in that behalf by the Inspector-General of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalties.*—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable to a fine not exceeding five hundred rupees (Rs. 500) and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

7. *Repeal Clause.*—Ordinances No. 33 of 1903 and 25 of 1912 are repealed.

8. *Short Title.*—This Ordinance may be cited as "The Wireless Telegraphy (Amendment) Ordinance, 1913."

Passed in Council at Port Louis, Island of Mauritius, this twenty-ninth day of July, One thousand nine hundred and thirteen.

B REGULATIONS FRAMED UNDER THE WIRELESS TELEGRAPHY ORDINANCE No. 11 OF 1913 (ARTICLE 4).

1. Apparatus for wireless telegraphy on board a merchant ship shall not be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

2. Apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall not be worked in such a way as to interfere with

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

3. In these regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval

station and any other wireless telegraph station whether on shore or on any ship.

4. For the purpose of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. Any person who shall offend against any of these Regulations shall be liable to a fine not exceeding five hundred rupees (Rs. 500), and any apparatus for wireless telegraphy in connection with which the offence was committed may be seized and forfeited.

8. The Regulations published under Government Notification No. 19 of January 25th, 1913, are hereby repealed.

Made by His Excellency the Governor in Executive Council at a meeting held on August 22nd, 1913.

C ADDITIONAL REGULATIONS RESPECTING THE TRANSMISSION OF MESSAGES BY WIRELESS TELEGRAPHY.

(MADE UNDER ARTICLE 4 OF THE WIRELESS TELEGRAPHY ORDINANCE NO. 11 OF 1913.)

1. Telegrams for transmission to ships at sea will in all cases be held at the Wireless Station until the ship in question arrives within range, *i.e.*, telegrams will not be transmitted to a ship which is approaching the Island until she has called the wireless station for the first time.

2. In the case of a ship going away from the Island the telegram will be transmitted immediately on receipt at the wireless station unless she is known to have already passed out of range. In this case and in all cases where the transmission of the telegram by wireless

proves to be impossible, the sender will be informed by service advice from the post office at which he handed in his telegram, and will be refunded the wireless charges.

Made by the Governor in Executive Council at a meeting held on the twenty-sixth day of December, 1913.

D REGULATIONS GOVERNING THE TRANSMISSION OF MESSAGES BY WIRELESS TELEGRAPHY THROUGH ROSE BELLE STATION, TO AND FROM MERCHANT SHIPS AT SEA.

(MADE UNDER ARTICLE 4 OF THE WIRELESS TELEGRAPHY ORDINANCE NO. 11 OF 1913.)

1. Messages received by wireless telegraphy from merchant ships at sea will be handed in at Rose Belle Post Office by an officer or agent of the wireless station and will be transmitted to any of the telegraph offices of the Colony for delivery to the addressee subject to the following conditions and charges:—

(a) A terminal charge will be made at the rate of R. 0.02 cents. of a rupee per word.

(b) The usual end portage charges from the post office of destination to the addressee will be made.

2. Messages for transmission to merchant vessels at sea will also be accepted at any of the telegraph offices in the Colony subject to the following conditions and charges:—

(a) The charge for messages shall be at the rate of 62 cents. of a rupee per word.

(b) The charge for portage from Rose Belle Post Office to the wireless station shall be 50 cents. of a rupee.

(c) Every message shall bear the supplementary word "wireless" for which a charge of 2 cents. of a rupee will be made.

3. The rules and regulations for the acceptance and transmission of messages by wireless telegraphy shall be in accordance with the rules and regulations of the Mauritius Post Office and Telegraphs for the time being in force.

4. Messages in code will not be transmitted or received by wireless telegraphy.

5. Regulations published under Government Notices No. 94 of 31st May, 1910, and No. 47 of 25th February, 1920, are repealed.

Made by the Governor in Executive Council, at a meeting held on the ninth day of July, one thousand nine hundred and twenty.

MEXICO

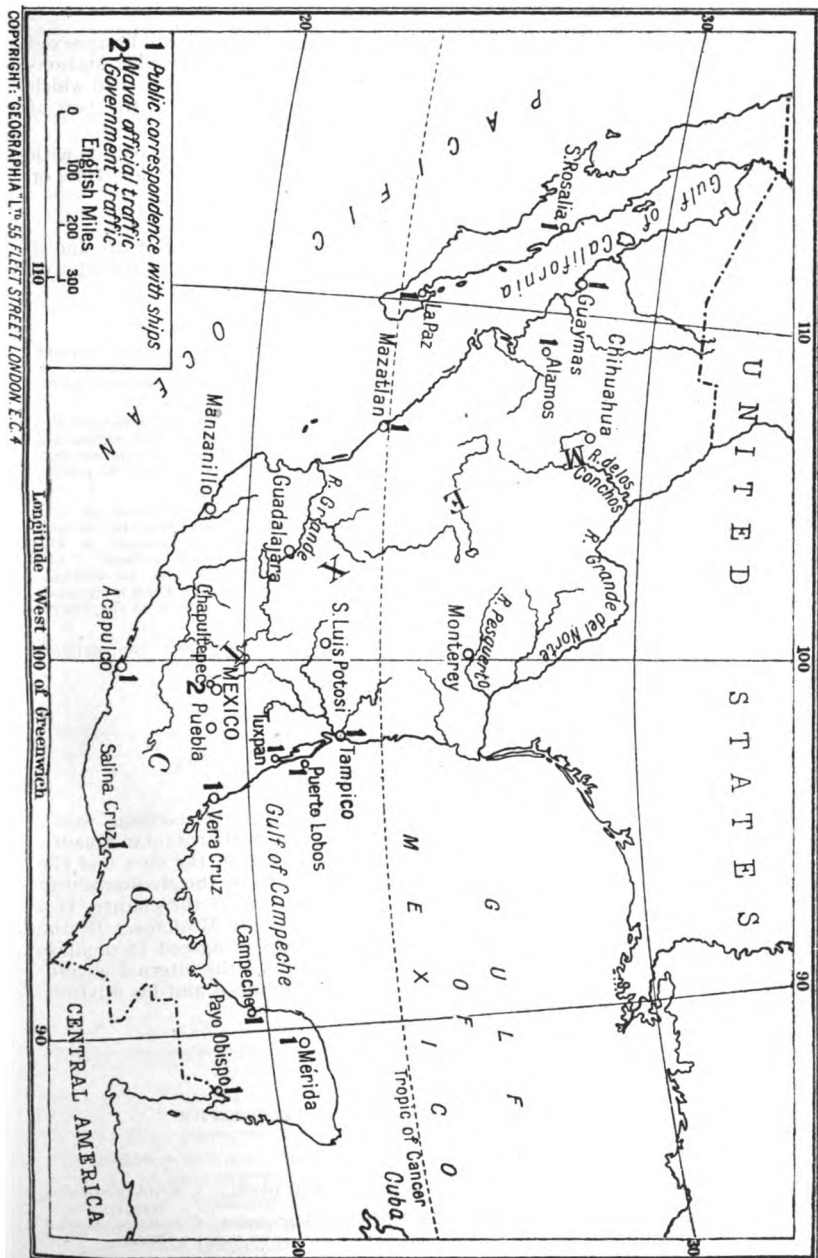
OCCUPYING an important position in the southern part of the Continent of North America. With an extensive seaboard both on the Atlantic and Pacific Oceans Mexico stretches from 15° 0' to 32° 30' N. latitude, and lies between 87° 0' and 117° 0' W. longitude. It covers an area of 768,883 square miles, and comprises 27 States and three Territories, besides the Federal District of Mexico.

CONTROL.

The National Radiotelegraphic Service is controlled by the Director-General of National Telegraphs, whose officials constitute the Executive in all matters referring thereto. The Radiotelegraphic Service is actually in charge of the Technical Department of the Director-General himself.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Sr. M. Mendez	Director-General of National Telegraphs ..	Mexico City



ORGANISATION.

Forms of licences for erection of stations and for operators will be annexed to the Law in the course of being codified. The radiotelegraphic stations open for public service to ships are fourteen in number, in addition to which we may include the installation which was recently completed at the port of Salina Cruz.

There are at present no radiotelegraphic arrangements in connection with aviation, nor do the *National Stations* maintain any service for Time or Weather Signals.

ADMINISTRATION.

A National Radiotelegraphic Law is in course of being drawn up, and it is expected it will shortly come into force. The only extant decree relative to radiotelegraphy runs as follows:—

A—Decree of October 19th, 1916.

A ART. I.—The establishment and exploitation of Radiotelegraphic Stations is forbidden in the Mexican Republic except under the express authorisation of the Federal Government, which can only accord it on the terms and under the conditions which are contained in the Regulations attached to the said Law.

ART. II.—Anyone who without the authorisation of the Federal Government establishes a Radiotelegraphic Station shall be liable to a penalty of 500-1,000 pesos, or imprisonment from 1 to 11 months, or shall suffer a combination of both penalties in accordance with the seriousness of the offence. Moreover, all apparatus, machines, and accessories forming part of the installation shall be sequestered for the benefit of the State.

ART. III.—If any corporation which installs a Radiotelegraphic Station be a company or

any other responsible body, direct responsibility with regard to the infraction of this law is vested in the person of the directors, agents or administrators.

ART. IV.—Any persons who make use of a Radiotelegraphic Station installed without the authorisation of the Federal Government shall be liable to a punishment of half the penalty enacted in ART. II preceding.

ART. V.—Any persons who make use of a Radiotelegraphic Station without the authorisation of the Federal Government, or who intercept a communication between Public Departments, or who divulge its contents, shall be liable to the penalty which is contained in ART. 770 of the Penal Code of the Federal District.

ART. VI.—This Law enters into operation from the date of its publication.

MONTSERRAT

(See LEEWARD ISLANDS.)

MOROCCO

KNOWN to the natives as "Maghreb-el-Aksa" (the farthest west), Morocco is an empire sometimes spoken of as the Mauritanian Quadrilateral. It lies in North West Africa between Algeria on the east and the Atlantic Ocean on the west, and is bounded on the north by the Mediterranean and on the south by the Sahara Desert. The language of the country is a dialect of Arabic, and the majority of its inhabitants are Moslems. By the Conference of Algeciras, held in 1906, France and Spain agreed to organise the police force and customs of the coast towns, whilst the internal government of the country lies mainly in the hands of the Sultan and his advisers.

(a) FRENCH ZONE.

CONTROL.

The present arrangements are as follows:—

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
M. le Colonel Apiano ..	Directeur du Service des Communications..	Résidence Général Rabat.
M. Walter	Directeur de l'Office des Postes Télégraphes et Téléphones	Résidence Général Rabat.

The Directeur du Service des Communications at the Residency General is in control, through a controlling station at the Residency General, of all wireless telegraph stations, Civil, Military, and Naval, in the French zone.

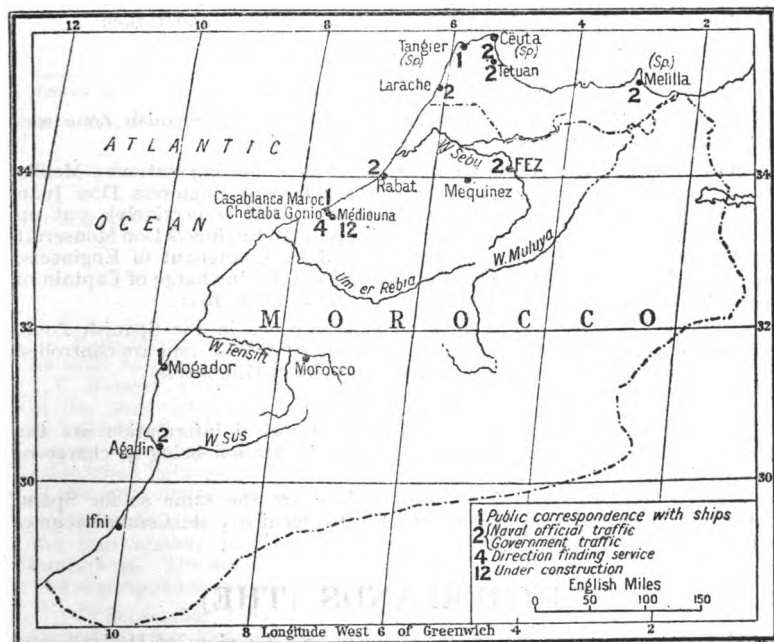
N.B.—This control station is not the same as the Rabat Station CNF which is now in disuse or used only for reception of certain purely official communications.

ORGANISATION.

The question of establishing wireless telegraph stations in Morocco first arose in 1906, when the Shereefian Government decided to erect several stations. A company was formed at Tangier, called the Société Internationale de la Télégraphie Sans Fil, which received the concession to instal the service. Its director was M. Henri Popp, a French engineer. The company did not exist long, however, for in 1908 the Shereefian Government bought it out, M. Popp remaining as manager and chief engineer.

The first stations to be established were Tangier and Casablanca, in 1907. Next came Rabat, in 1908, and Mogador at the end of the same year.

In 1910 M. Popp died, and was succeeded by M. Biarnay, under whose direction the Fez station was established during the summer and autumn



of 1911. Since then the Shereefian Government has created no further stations. The French Military Authorities, however, have stations all over the French Zone, including one at Agadir. Portable military wireless telegraphy installations have been in use by French mobile columns since 1911.

The present organisation consists of the Shereefian Government station at Tangier, Casablanca, Mogador, Rabat, and Fez. Of these the first three only are for public use, the stations at Fez and Rabat being solely for military use. Wireless telegraphy in the French Zone forms a Government monopoly.

The various military and civil posts all over Morocco (French Zone)

keep the Service des Communications at the Residency General informed of meteorological conditions at their several posts, and the Service des Communications also receives the Eiffel Tower, Madrid, Algiers, etc., news, and hands it on to the Aviation Militaire and the Bureau de Meteorologie Militaire; but this is only for military use.

It has been suggested that this news might be made public, and means of doing so, and Regulations for publishing wireless news for aviation and meteorological purposes, are now under consideration.

Such Regulations will be grounded on, or in accordance with the agreements formulated at the recent Convention Internationale de Navigation Aérienne.

ADMINISTRATION.

Military wireless telegraph stations keep headquarters at Rabat informed as regards meteorological conditions for the use of the military Aeronautical Bureau.

The current Laws and Regulations governing wireless telegraphy consist of the Radiotelegraphic Convention of London, 1912.

No licences are given, and it is *not* probable that legislation for the grant of licences for working wireless telegraphy will shortly be undertaken.

(b) SPANISH ZONE.

CONTROL AND ORGANISATION.

The first wireless telegraph station installed in the Spanish Zone was that of Melilla (call letters EGB), erected in July, 1918.

At the present time there are in existence the following stations: Melilla (EGB), erected in July, 1918, in charge of Captain of Engineers Don Juan Reig Valerino; Ceuta and Tetuan (EGD and EGK respectively), put up in July, 1911, and July, 1914, in charge of Captain of Engineers Don Monserrat Fenech Munoz, Diploma of the Staff, assisted by Lieutenant of Engineers, Don Antonio Guerindian Ponte, and Larache (EGF), in charge of Captain of Engineers Don Jesus Prieto Rincon, put in December, 1911.

These are the only permanent wireless stations in the Spanish Zone. They are all under the jurisdiction of the Ministry of War, and are controlled by the Centro Electro-tecnico y de Comunicaciones (Engineers).

ADMINISTRATION.

Existing arrangements as regards meteorological information are the same as those for Spanish Stations, the Madrid Station being in charge of this service.

The Regulations governing these stations are the same as for Spain, and licences are given by the Centro Electro-tecnico y de Comunicaciones after the necessary examinations.

NETHERLANDS (THE)

THE Netherlands is the official name of the Kingdom of Holland, and possesses the same signification as its old English title of the "Low Countries." During the fourteenth century the Countship of Holland and Earldom of Flanders became appanages of the Dukes of Burgundy, and through them passed under Spanish rule, which, tyrannically exercised, ended in the establishment of the Netherlands Republic. At the close of the seventeenth century the Stadtholdership was revived for a time in the person of William, Prince of Orange, who became King of England. The **B**atavian Republic (a combination of Holland and Belgium) was established by the French at the end of the eighteenth century, and this was later converted into a Kingdom under Louis Bonaparte. The Orange family was

recalled after Napoleon's fall; but Belgium seceded from the "United Kingdom" in 1830. The present Queen Wilhelmina is a scion of the House of Orange.

The eleven provinces into which Holland is divided lie between 50° 46' and 53° 34' N. latitude, extending from 3° 22' to 7° 14' E. longitude. They cover a total area of 12,761 square miles. Holland is a constitutional monarchy, the executive being vested in the King or Queen (acting through the Ministers), and the power to make laws in the King or Queen with Parliament ("Staten Generaal"). The Parliament consists of two chambers, of which the second is directly elected by the people and the first by the "Provinciale Staten." The chief commercial cities are Amsterdam and Rotterdam, the court capital and centre of administration being located at The Hague (Den Haag).

CONTROL.

Except in so far as the Navy, the Army, and the Colonies are concerned, wireless telegraphy is placed in the hands of the Director-General of Posts and Telegraphs under the supervision of the Minister of Waterways.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Minister A. A. H. W. Koning	Minister of Waterways ..	Zyne Excellentie den Minister van Waterstaat te 's Gravenhage
Mr. E. P. Westerveld ..	Director-General of Posts and Telegraphs	Den Heer Directeur Generaal der Posteryen en Telegrafie te 's Gravenhage
Mr. A. E. R. Collette ..	Chief Engineer, Director of Telegraphs	Den Heer Hoofdingenieur Directeur der Telegrafie te 's Gravenhage
Mr. H. J. Nierstrasz ..	Inspector of Coast and Ship Radiotelegraph Service	Den Heer Inspecteur bij den dienst der Kust-en Scheepsradiotelegrafie Scheveningen-Haven

ORGANISATION.

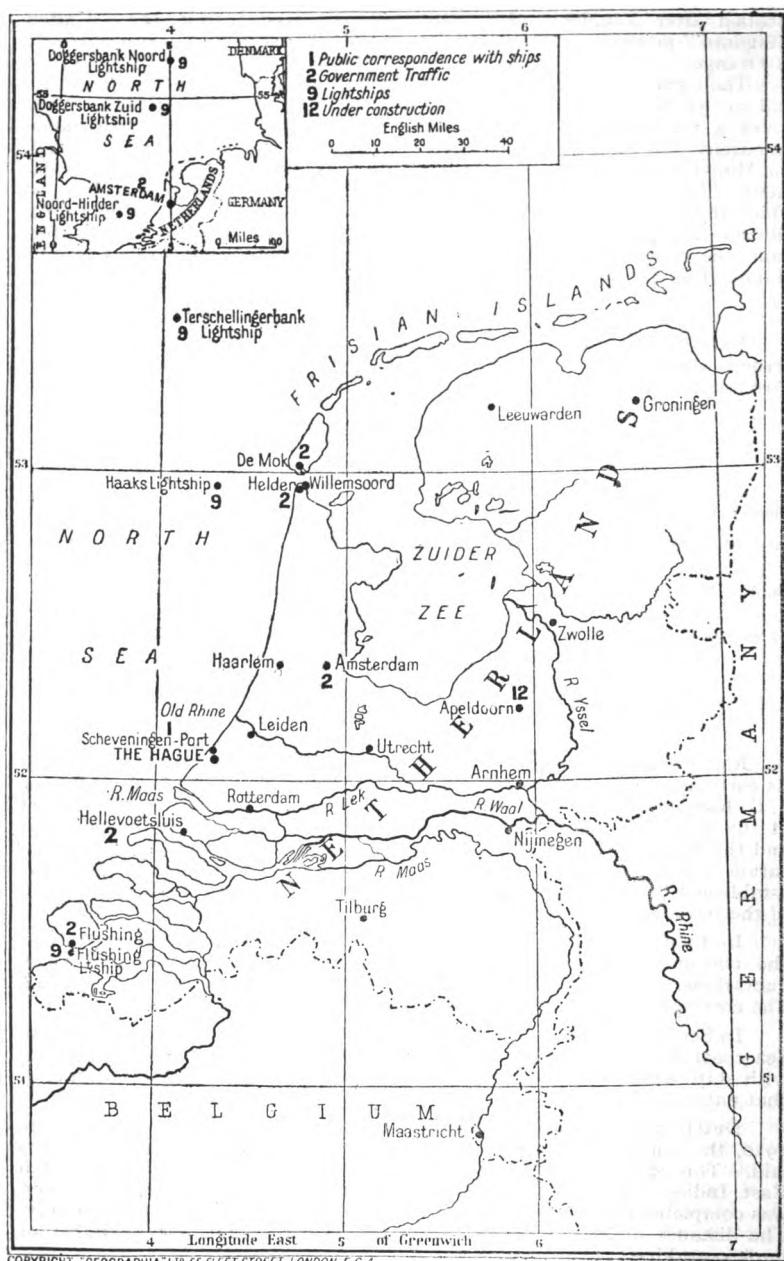
Radiotelegraphy has from its initiation attracted much interest in Holland. As early as 1899 a commission (Messrs. B. J. R. Engelbregt, C. J. de Vriese, J. C. Ramaer, and Dr. L. Bleekrode) was appointed to report on the subject of the possibility of wireless communication between the lightship *Maas* and the Hook of Holland (16 km.). In the beginning of 1902 this communication was sufficiently ascertained. In the same year wireless traffic was established between the railway stations Enkhuizen and Stavoren on behalf of the ferry steamer between the two places.

In February, 1904, a Marconi station was opened at Amsterdam for the transmission to Broomfield, in Essex, of press messages and stock quotations. The messages were published in the newspaper *Het Handelsblad*. The correspondence was of private nature, and ceased after some time.

In September, 1904, the Government station, Scheveningen Port (North Sea coast, near The Hague), was opened for general public correspondence with ships at sea. Scheveningen was the first Government coast station of that nature in Europe.

Dutch radiotelegraphy has extended in all directions. On August 9th, 1920, the foundation stone of a station at Kootwyk, near Apeldoorn, was laid. This station is destined for direct communication with the Dutch East Indies. The receiving station situated at Sambeek, near Boxmeer, was completed earlier, and test service messages are received there regularly. The distance of 60 km. between these two stations makes them suitable for duplex-working.

In the course of 1920 a meteorological service was established on behalf


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of aviation between the military radiostation at Soesterberg and the station of the Air Ministry at London.

Since August 2nd, 1920, the military station Bé (Vossegat) is sending regularly weather reports from the Koninklyke Meteorologisch Instituut.

On August 9th, 1920, a regular radioservice open for public correspondence was established between Rotterdam and Düsseldorf. Telegrams to Germany are sent by this route only at the request of sender.

Since June, 1920, a Government committee has been studying the desirability of erecting direction-finding stations on the Dutch coast.

LAND STATIONS (NETHERLANDS).

January 1st, 1920.

Official correspondence ; Naval stations, (Aerodromes and Army stations not included)	5
Government station open for public service with ships	1
Government station open for public service (Land traffic)	1

Moreover there are a large number of amateur stations only suitable for reception.

SHIP STATIONS (NETHERLANDS).

January 1st, 1920.

Stations worked by private enterprise open for public service	192
Government stations open for public service ..	3
Navy stations (submarines, torpedo boats, etc., not included)	34
Special stations on board lightships	5

LAND STATIONS (DUTCH EAST INDIES).

(According to the latest available statistics.)

Stations for public correspondence with ships ..	5
Stations for restricted public correspondence with ships	2
Stations under construction	1

LAND STATIONS (CURAÇAO).

Public correspondence with ships	3
--	---

A permit has been granted for the working of some stations on board river boats of the police at Rotterdam. Other private stations have been allowed for scientific and similar purposes. Temporary permits have also been granted to the Stock-Jobbing Union at Amsterdam for radiotelephonic publications of rates during time of Exchange and to a station at Ymuiden for radiotelephonic correspondence with fishing boats. For stations only suitable for reception a permit is not necessary.

Stations on ships at sea may not be established or worked by private enterprise without a licence issued by the Queen. The general conditions which are imposed are laid down in the form given below (E).

ADMINISTRATION.

The regulation of radiotelegraphy was first instituted by including a clause relating to wireless in the Telegraph and Telephone Act of 1904. This Act has been supplemented and amended, as far as radiotelegraphy and telephony are concerned, by the Act of March 21st, 1919. This Act, which became effective on November 15th, 1919, also includes the regulations concerning radio stations not destined for general public service, which hitherto were fixed in the Royal Decree of March 6th, 1905. It includes, furthermore, the provisions for the use of stations on vessels of foreign nation-

ality within territorial waters and in waters within the territory of the kingdom, as well as for the acknowledgment of foreign licences (Art. 9, Radiotelegraph Convention of London). On May 10th, 1906, a further Royal Decree fixed a Provisional Tariff for the Telegraphic Communication of Wireless Reports and Distress Signals from ships at sea. The text of the Telegraph and Telephone Act and the above-mentioned Decree will be found below, so far as they appertain to radiotelegraphy.

In 1919 Parliament passed the Bill (presented by the Minister of Agriculture, Industries and Commerce in 1916) to give effect to the International Convention for the Safety of Life at Sea. This Act (Shipping Convention Act of April 5th, 1919) is in agreement with the Articles of the Convention, but has not yet come into force.

The Netherlands possesses important colonies in the East Indies, as well as in South America, and the wireless laws and regulations current in those colonies are appended in the following pages.

The text (so far as radiotelegraphy is concerned) of the following enactments figure below :—

- A**—Telegraph and Telephone Act, 1904 (supplemented and amended by the Act of March 21st, 1919).
- B**—Royal Decree of the 10th May, 1906.
- C**—Regulation for Colony of Curaçao.
- D**—Regulation for Dutch East Indies.
- E**—Form of Licence for Ship Stations.
- F**—Prescriptions issued by the Minister of Waterways regarding the working of foreign vessels within territorial waters or on waters within the territory of the kingdom.

TELEGRAPH AND TELEPHONE ACT OF 1904.

A The Telegraph and Telephone Act of 1904 mainly refers to the ordinary wired services, and it has not been judged worth while, therefore, to reprint it in full here.

According to Article II of this Act, a licence granted by the Queen is necessary before telegraphs and telephones can be established or worked by private enterprise. The Act also contains the terms under which the licence is issued and the conditions binding on the licensee.

The above provision is also applicable to wireless telegraphy.

Article III prescribes that for the establishment and the use of radiotelegraph and telephone stations not destined for general public service an authorisation from the Minister of Waterways is required.*

ART. IIIA.—It is forbidden to work radiotelegraphs and telephones, be they destined for public service or not, on board vessels other than of Dutch nationality when within territorial waters, or in waters within the territory of the kingdom, unless it be done in accordance with the prescriptions fixed by the Minister of Waterways (see "F").

For the radiotelegraphs and telephones referred to in the first part of this Article neither licence nor authorisation is required, unless they are within the territorial waters of the kingdom and without the licence required in virtue of the International Telegraph Convention (with Regulations) of London such as

* NOTE.—Stations only suitable for the reception of radiotelegraphic signals are not considered as radiotelegraph and telephone stations.

it is at present constituted (*Staatsblad* 1913, No. 132) or may be constituted, also as it may be modified for the Netherlands.

B Decree of May 10th, 1906, relating to the fixing of provisional tariff for telegraphic communications for reports and distress signals received by radiotelegraphic means from ships at sea.

ART. 1.—The Government Office with radiotelegraphic service at Scheveningen Harbour shall report by telegraph, to those who have notified themselves for the purpose, the communications from ships and distress signals received by way of radiotelegraphy.

ART. 2.—The reports referred to in Article 1 shall be supplied within the Netherlands subject to the payment by the addressee of a coast charge of 1 florin for the present for each communication, increased by an amount of 50 cents if the telegram to be drawn up does not contain more than 10 words, and of 25 cents above this for each successive 10 words or fraction thereof.

Nevertheless, the reports herein mentioned may also be supplied against such a fixed price per year as shall be fixed by our Minister of Waterways, Commerce and Industry for each interested party, taking into consideration both the number and the extent of the required information and also the above-named tariff.

In supplying the reports referred to in this Article to interested parties outside the Netherlands, the above-mentioned costs will be increased by the foreign telegraphic tariff applying thereto.

ART. 3.—This Decree shall come into operation on the second day after the date of the *Staatsblad* and the *Staatscourant* in which it is published.

Our Minister of Waterways, Commerce and Industry is entrusted with the execution of this

Decree, which shall be published simultaneously in the *Staatsblad* and in the *Staatscourant*, and a copy whereof shall be sent to the State Council.

REGULATIONS FOR TELEGRAPHIC SERVICE IN THE DUTCH COLONY OF CURAÇAO.

(See map on p. 311.)

Publication No. 52 of 1909. (21st September.)

C The Governor of Curaçao, in view of the desirability of replacing by new regulations the decree of the 30th October, 1873, regulating the inland and foreign telegraph communication of the colony as well as that of the 27th September, 1884, regulating telephonic communication, and having received the sanction of the Colonial Council, has determined on the following decree:—

ART. 1.—In this decree it is understood that telegraphs and telephones refer to the usual line-telegraphs and telephones as well as to radiotelegraphs and telephones.

ART. 2.—No telegraphs and telephones may be installed on any of the islands of the colony by others than the Government, unless a special permit is granted. Besides the special conditions, made in each case, the general rules are:—

(a) The erection, maintenance and exploitation should be carried out to the satisfaction of the Governor.

(b) The tariffs, conditions of use and service regulations must be submitted for the approval of the Governor.

(c) The concession may be granted absolutely or conditionally, but for no longer period than 25 years.

(d) The concession may be withdrawn by the Governor if the above rules or the special conditions are not followed.

ART. 3.—It is forbidden, without the permission of the Governor, to use radiotelegraphs or telephones, fitted on board foreign or private-owned Dutch ships, in the ports or anchorages of the colony, unless in special circumstances, the exigencies of good seamanship render it necessary to do so.

ART. 4.—Everybody may make use of telegraphs and telephones under the existing regulations. The transmission of telegrams or the conversation by telephone may be stopped or refused if in conflict with the safety of the colony, public order, or common decency.

The reasons for refusal or stoppage should be communicated to the party concerned.

The decision of the Governor may be invoked in such cases.

ART. 5.—For the public interest the Governor may put telegraph and telephone service under control or partially suspend it for an indefinite period.

ART. 6.—In case of war, or if any of the islands of the colony be placed under martial law, if so desired the telegraphs and telephones may be put under Government control.

ART. 7.—Imprisonment of one day to six months and fines from 10 florins to 1,000 florins conjointly or separately will be inflicted on those who erect or exploit telegraphs and telephones, without the permission required as specified in Art. 2; or who on board private-owned ships, make unlawful use of the same (Art. 3).

The instruments may, in so far as they are owned by the guilty parties, be confiscated.

ART. 8.—Anyone who wilfully damages or destroys telegraph and telephone works, including cables, in use for public benefit, will be punished with imprisonment from three months to three years.

Anyone who causes such damage as is referred to above, through neglect, may be punished with imprisonment of one day to one month or a fine of 1 florin to 100 florins.

ART. 9.—Deals with the punishment of crimes committed in which telephones are used.

ART. 10.—Libellous, offensive and indecent expressions used over the telephone, will be considered as uttered in public.

ART. 11.—Violation of the secrecy of telegraphs and telephones is punishable in accordance with Arts. 137 and 327 of the existing law.

ART. 12.—Owners of property have to allow, if it is necessary, work to be done on it in connection with the erection of public telegraphs.

ARTS. 13, 14, 15 and 16 deal with the use of private property in the erection of telegraph and telephone lines.

ART. 17.—All precautions should be taken to prevent lightning being conducted along cables or lines.

ART. 18.—The above may be referred to as "Telegraaf- en Telefoon-Verordening 1909," adding the number of the publication.

ART. 19.—Decrees of 30th October, 1873 (P.B. 1874, No. 1) and of 27th September, 1884 (P.B. 1884, No. 14) as well as P.B. 1892, No. 27, are withdrawn.

ART. 20.—Concessions relating to the erection of telegraphs and telephones on any of the islands of the Colony of Curaçao, granted before this decree comes into force, will be treated as coming under the regulations in force when they were made.

REGULATIONS FOR TELEGRAPH SERVICE IN THE DUTCH EAST INDIES.

6th October, 1876.

(See map on p. 139.)

D The old regulations issued by decree of 31st March, 1858, concerning the electro-magnetic telegraphs should now be superseded and new regulations as hereunder be brought into force.

Regulations concerning the erection and use of telegraphs in the Dutch East Indies.

ART. 1.—No telegraphs may be erected or used without permission of the Government, except those exclusively owned and used privately.

ART. 2.—The conditions for permission to erect such telegraphs will be fixed in each case separately.

ART. 3.—The Governor-General has the right to take possession of all telegraphs or to stop their exploitation.

ART. 4.—If telegraphs are erected without permission open for public traffic, a fine of from 200 florins to 1,000 florins can be inflicted.

ART. 5.—Owners of property have to allow, if it is necessary, work to be done on it in connection with the erection of public telegraphs.

ART. 6.—They should give access to officials and not interfere with the work done and the lines erected.

ART. 7.—If they refuse access they will be fined from 25 florins to 100 florins.

ART. 8.—They have a right to compensation for damage done to their property.

ART. 9.—Everybody has a right to have telegrams sent under the conditions laid down in the service regulations.

ART. 10.—The State or the Telegraph Company is not responsible for the transmission of telegrams in general or within a certain time.

ART. 11.—Punishment for embezzlement or opening of telegrams, communication of their contents to outsiders, etc., will be inflicted in accordance with the existing laws.

ART. 11a.—Telegrams, the contents of which are of danger to the State, or in conflict with the law, or of an obscene character, will not be accepted or delivered.

ART. 12.—Punishment in accordance with the existing laws is to be inflicted on every official who falsifies telegrams and on those who knowingly profit by the misuse of such telegrams.

ART. 13.—Damage to telegraph works or material is punishable with imprisonment and penal servitude.

ART. 14.—The Head of the Local Council may order, on request of the Chief of the Telegraph Service, the removal of everything impeding the efficiency of that service.

The above was published in the *Official Gazette (Staatsblad)* of the Dutch East Indies, and the regulations also apply to Telegraphs or Telephones, whereby the apparatus at both ends is not connected with wires or conductors (Decree of 7th December, 1903. *Staatsblad*, No. 405, supplemented by Decree of 8th September, 1905. *Staatsblad*, No. 403).

LICENCE FOR SHIP STATIONS.

E ART. 1.—In this licence is meant—By Convention: the Radiotelegraphic Convention with final protocol, signed in London on July 5th, 1912, and all alterations and additions, that may be made thereto.

By Regulations: the Regulations belonging to this Convention with all alterations and additions that may be made thereto.

ART. 2.—The licence is given for an indefinite period, and may be withdrawn at any time, after one year's notice.

The licence, or an authentic copy of it, should always be kept on the ship. It must be shown on request abroad if asked for by the persons authorised herein.

ART. 3.—*System*.—The licensee is obliged to choose a system capable of communication with the Government stations opened for public radiograms, and to make the installation comply with the International Laws and Regulations. The antenna input should be such as to enable a decrease down to 10 per cent. of the maximum input. If an emergency set is required, as set forth in Art. XI of the International Regulations, the source of power, and eventually the other parts of the installation, must be fitted on or above the upper deck, and, furthermore, are subject to the rules to be made therefor by the Director-General of Posts and Telegraphs. In case the position of the wireless cabin does not give the telegraphist direct

communication with the bridge, without leaving the operating room, direct communication must be established as may be required by the Director-General of Posts and Telegraphs.

ART. 4.

Hours of Service.

A. *First Class*.—On ship stations belonging to the first class, as stipulated in Art. 13, s. 3, of the Regulations, a continuous service is maintained. Except in cases of *force majeure* these rules should not be discarded without consent of the Director-General of Posts and Telegraphs.

B. *Second Class*.—On ship stations belonging to the second class, as stipulated in Art. 13, sec. 3, of the Regulations, the service is maintained during the hours indicated in the official list of radiotelegraphic stations. The hours of service are fixed in consultation with the Director-General of Posts and Telegraphs. Except in cases of *force majeure*, these rules should not be discarded without consent of the Director-General of Posts and Telegraphs.

C. *Third Class*.—Here the article only stipulates that the ship station belongs to the third class as indicated in Art. 13, sec. 3, of the Regulations.

ART. 5.

Information.

As for the station on shipboard the licensee is obliged to provide the Director-General of Posts and Telegraphs with all facilities and information necessary for the fulfilment of all legal requirements.

ART. 6.

Approval of the Ship Station and its Operators.

No station on shipboard may be worked before the Director-General of Posts and Telegraphs has approved of the installation, as well as of the numbers, class and ability of the operators. A written document approving of the installation is handed over by the Director-General of Posts and Telegraphs, and should be hung up close to, or inside, the operating room. Any change made must be approved of in the same way.

Officers authorised by the said Director-General of Posts and Telegraphs must always be admitted for the purpose of testing whether the plant still fulfils the requirements. Any examination effected in this way is registered on the said document.

As a proof that the operators are competent, a certificate containing the name of the holder mentioning the class, is issued by the Director-General of Posts and Telegraphs. Moreover, it is stated thereon that the bearer is under an obligation to the said Director-General of Posts and Telegraphs of keeping secret any telegrams that might come to his knowledge by virtue of his position on board ship.

This certificate may be withdrawn if it is evident to the Director-General of Posts and Telegraphs that the holder no longer fulfils the requirements, or that he has failed to observe the conditions of this licence.

Alterations to the installation of the ship station falling under any rule of the Convention or the Regulations, and changes concerning the operators must be at once reported to the said Director-General of Posts and Telegraphs.

ART. 7.

Authorisation to work Station.

The licensee is authorised to exchange telegrams with stations opened to public correspondence, as well as with stations not destined for public wireless traffic, as far as

this does not interfere with public correspondence; both authorisations hold good, subject to their not infringing any private rules which might be in force at any of these stations. All communication by a ship station must cease immediately upon the request of a Dutch coast station open to public correspondence.

ART. 8.

Wavelength.

In addition to the wavelength of 600 and 300 metres provided for in Art. 3 of these Regulations, other wavelengths less than 600 metres are used in some cases according to the provisions made by the Director-General of Posts and Telegraphs.

ART. 9.

Places where Transmission is Prohibited.

Apart from the conditions of the Regulations appertaining thereto, it is hereby forbidden without the consent of the Director-General of Posts and Telegraphs, given with due regard to the relevant conditions, to use the ship stations within Dutch territorial waters or any Dutch waters inside those limits, unless under special conditions the requirements of good seamanship make contravention of this rule a necessity.

ART. 10.

Cessation of Traffic.

The working of a ship station is suspended either completely or partly as soon as it is judged necessary to the general interest. Upon the order of the Director-General of Posts and Telegraphs, the service may be suspended at certain places or daily during certain hours.

ART. 11.

Approval according to Art. 2 of the Telegraph and Telephone Act.

The remaining conditions concerning the use, Service Regulations, and the rate of wages and hours of duty of the operators, are submitted for the approval of the Minister of Waterstaat.

ART. 12.

Exchange of Telegrams.

The conditions of the Dutch Telegraph and International Regulations, and further, the conditions concerning the public Dutch radiotelegraph service, as well as all modifications and supplements thereto, refer to the exchange of telegrams.

ART. 13.

Ship Tax.

The ship tax amounts to

ART. 14.

Accountancy.

The settlement of taxes takes place according to the rules to be fixed by the Director-General of Posts and Telegraphs.

ART. 15.

Secrecy of Correspondence.

The licensee is obliged to observe secrecy in regard to all telegrams which might come to his knowledge by means of the ship station. He must make sure that no person other than the operator in charge of the station has any opportunity of learning the contents of said telegrams.

ART. 16.

Forwarding of Documents.

The forwarding of documents concerning the radiotelegraphic service must take place under the rules of the Director-General of Posts and

Telegraphs made according to the restrictions mentioned in Art. XI of the Regulations.

ART. 17.

Precautions.

The licensee is obliged to take all precautions desired by the Minister of Waterstaat within the period fixed in the licence.

ART. 18.

Control.

Officers appointed by the Director-General of Posts and Telegraphs are authorised to control the working of the station and its operators, and to supervise the station service generally. If required they may also take temporary control of the station, upon showing a written and signed authorisation.

ART. 19.

Distress Signals.

For sending or receiving distress signals it is allowed to depart from the conditions of this concession, provided this deviation is necessary for the benefit of the ship in distress. For the distress signal (which may also be given in cases of other accidents than those which may occur to the ship concerned) no other signal may be used except the signal $\bullet \bullet \bullet \text{---} \bullet \bullet \bullet$, unless approved by the Director-General of Posts and Telegraphs.

ART. 20.

Meteorological Telegram, Time Signals, and other Signals.

The licensee is obliged to adhere to the rules which are made by or on behalf of the Minister of Waterstaat with reference to meteorological telegrams, time signals, and other signals.

ART. 21.

Authorisation and Obligations Outside the Territorial Waters of the (Dutch) Kingdom.

Outside the territorial waters of the Kingdom the rules of this licence are valid in so far as they are not contradictory to the Laws and Regulations which hold good in the locality in question.

ART. 22.

Other Rules and Regulations.

Moreover, the licensee is subject to and henceforth obliged to adhere to all Regulations referring to radiotelegraphy which are prescribed or will be prescribed by Dutch law; by the Convention and the Regulations; or by any other International agreement to which Holland accedes or will accede; as well as to any modifications which may be deemed necessary for the execution of such Regulations.

ART. 23.

Withdrawal of Licence.

This licence may be withdrawn—

1. If within a year no use is made of it.
2. By not adhering to the prescriptions of the Telegraph and Telephone Act of 1904 (Official Collection of Laws No. 7), under which prescriptions this licence is granted, or by not adhering to any rule mentioned in the said national or international legal prescriptions.
3. If the ship mentioned at the beginning of this licence ceases to be a Dutch ship.

ART. 24.

Further Obligations of the Licensee.

A. *First Class.*—The licensee is under an obligation to give immediate notice to the Director-General of Posts and Telegraphs when an altered service Regulation in consequence of

Art. 4, last paragraph, of this licence is introduced, also when the ship on which the station has been fitted is out of commission or changes owners.

B. *Second Class.*—The licensee is under an obligation to give immediate notice to the Director-General of Posts and Telegraphs when an altered service Regulation in consequence of Art. 4, last paragraph, of this licence is introduced; and also when the ship on which the station has been fitted is out of commission or changes owners.

C. *Third Class.*—The licensee is under an obligation to give immediate notice to the Director-General of Posts and Telegraphs if the ship on which the station has been fitted is out of commission or changes owners.

ART. 25.

Violation of Rules.

In addition to the withdrawal of licence mentioned in Art. 23, except in cases of *force majeure*, the licensee is fined from F. 10 to F. 1,000, at the discretion of the Minister of Waterstaat, for each violation of any rule laid down in this licence, of the said national or international legal prescriptions, as mentioned herein, and is fined from Fl. 1 to Fl. 100 for each day, after the period fixed for paying the fines, that he fails to adhere to the rules of this agreement.

Dating from the day on which the decision to withdraw the licence in consequence of Art. 23 has been taken, fines are no longer due. This article may be applied immediately the said Minister decides the legal grounds for administering a fine; or the legality of a claim on grounds of *force majeure*.

In addition to the fine, the said Minister will decide to what cause the violation is due, to enable him to take action according to the contents of Art. 12 of the Regulations.

ART. 26.

Acceptance.

A declaration of agreement must be forwarded to the Director-General of Posts and Telegraphs, within the period fixed by him, intimating an acceptance of the terms of this licence.

PRESRIPTION ISSUED BY THE MINISTER OF WATERWAYS.

Regulations which are prescribed by the Minister of Waterways and which in as far as they do not differ from any international agreement, to which the Netherlands are, or will be bound, are valid for foreign radiotelegraphic or telephonic ship stations which are within territorial waters or in waters within the territory of the Kingdom.

ART. 1.—1. It is forbidden to use radiotelegraphs or telephones be they destined

for public service or not, installed on board of foreign ships within Dutch territorial waters or waters within the territory of the Kingdom, unless the prescriptions of this disposition are observed.

2. Moreover shall, as far as waters within the territorial limits of the Kingdom are concerned, those stations only may be worked by consent of the Director-General of Posts and Telegraphs when due regard is given to the conditions prescribed in said permit.

3. Contravention of the rules as set forth in parts 1 and 2 of this article is allowed under special conditions, the requirements of good seamanship should make this necessary.

ART. 2.—1. Foreign ship stations may exchange telegrams or have a conversation with radiotelegraph or telephone stations destined for public service under reserve of the special rules, which might be valid for any one of these stations.

2. The exchange of traffic with stations not destined for public service is permitted under reserve of the special rules which might be valid for any one of these stations, and in so far as in the opinion of one or more public stations, the general public radio telegraphic or telephonic service is not interfered with.

3. All traffic of foreign ship stations is immediately to be suspended, as soon as such is requested by any Dutch coast station open for general public service.

ART. 3.—1. It is forbidden that by means of foreign ship stations hindrance should be given to the exploitation or the use of Government radiotelegraphs and telephones be they destined for public service or not, or to the exploitation of other radiotelegraphs and telephones destined for public service.

2. Foreign ships must cease working of their stations as soon as they observe or when they are informed, that their working gives rise to an interference as described in part 1 of this article.

ART. 4.—1. The Minister of Waterways may suspend the working of foreign ship stations either completely or partly as soon as it is judged necessary.

2. The Director-General of Posts and Telegraphs has equal competency as far as it concerns suspension at certain places or daily during certain hours.

The licensees of foreign ship stations are subject to and henceforth obliged to adhere to all Regulations referring to radiotelegraphy or telephony which are prescribed by the International Radio Telegraph Convention with final protocol and Regulations of London such as it is at present (Staatsblad 1913 No. 132), of, later on, also for Holland, might be modified, either are or shall be prescribed by any other International agreement to which Holland accedes or will accede.

NEW CALEDONIA

(See FRANCE.)

NEWFOUNDLAND

(See map on p. 165.)

THE Island of Newfoundland lies between 46° 37' and 52° 39' north latitude; its longitude stretching from 52° 35' to 59° 25' west. Its north-western side is bounded by the Gulf of St. Lawrence, whilst the Straits

of Belle Isle divide it from the North American Continent. It is triangular in shape (almost equilateral), with Cape Bauld on the north, Cape Race on the south-east, and Cape Ray on the south-west.

Newfoundland ranks as the oldest British Colony, having been formally occupied by Sir Humphrey Gilbert in August, 1583. A Governor was first appointed in 1728, and in 1855 "Responsible Government" was accorded.

The Executive is vested in a Governor aided by an Executive Council with a legislature of two houses.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Hon. Mr. R. A. Squires, K.C., LL.B. . .	Prime Minister and Colonial Secretary . .	St. John's
Hon. Mr. W. F. Coaker	Minister of Marine and Fisheries	do.
Hon. Mr. W. W. Halfyard	Minister of Posts and Telegraphs	do.
Hon. Mr. Arthur Mews, C.M.G.	Deputy Colonial Secretary	do.
Mr. H. W. Le Messurier, J.P., C.M.G. . .	Deputy Minister of Customs	do.

Mr. H. W. Le Messurier, C.M.G., the Deputy Minister of Customs, refuses clearance to any vessels of Newfoundland Register not licensed in conformity with the Acts, or whose operators are not in possession of provisional service certificates issued by the Minister of Posts.

ORGANISATION.

The Colony is proud of its association with the first wireless message flashed across the Atlantic. This was received by Senatore Marconi himself on Signal Hill, an eminence overlooking the narrows of St. John's. Newfoundlanders hope that ere long some suitable memorial may be erected on Signal Hill of this epoch-making event.

In 1906 an agreement was made under which the Marconi Wireless Telegraph Company of Canada undertook to operate all the Labrador stations during the fishing season of each year, the Newfoundland Government to pay the company an annual royalty, and the revenue accruing from this traffic to go to the company, who further agreed to forward all traffic over the Newfoundland Government Postal Telegraph System.

The success of this arrangement prompted the Government to propose an extension of the system on the Labrador Coast by two or more stations—the Marconi Company to erect and operate the stations under the terms of the agreement. In the summer of 1913 stations were accordingly erected by the Marconi Company at Cape Harrison and Makkovik. In 1911 it was agreed to establish a station between Indian Harbour and Cape Harrison to complete the chain on the Labrador Coast.

After further negotiations, an important agreement was concluded in December, 1912, which covers the following points: The old agreement terminating in 1916 is extended for a further period of ten years, terminating in 1926; all other undertakings entered into in the earlier agreement will be continued until 1926. The Marconi Company has erected and is operating a station at Fogo, on the east coast of Newfoundland—this station to be the property of the Marconi Company, and to be exempt from the Government tax of \$4,000 during the currency of the agreement.

The Sealing Industry forms an important item in the industrial activities of the Colony, and the disaster of 1914 (wherein the *Southern Cross* was lost with all hands) led to the instalment of wireless equipment on the fleet of sealers, which was made compulsory by legislation to that effect.

At the present time the following stations exist:—

Public service to ships	6
Government service only	1
Public inland traffic	9
Direction-finding service	1
Ship stations	17

ADMINISTRATION.

The general Regulation of Wireless is governed by the Posts and Telegraph Acts, 1891 to 1906.

We subjoin :—

- A**—Act of 1905 (Cap. VII).
- B**—Post and Telegraph Act, 1906.
- C**—Wireless Telegraphy (Steamers) Act, 1914.
- D**—Wireless Licence.
- E**—Provisional Certificate for Wireless Operators.

THE ACT OF 1905, CAP. VII.

A This Act refers to taxes upon business transacted by telegraph and telephone companies within and in transit through the Colony. Clause 2, Section 2, reads as follows :—

A sum equal to one per cent. in manner hereinafter provided, of the total amount received by or due to the company in respect of all telegraphic messages passing over the land lines of the company or transmitted or received by any wireless method of telegraphy to or from any place within this Colony from or to any other place within this Colony during a period of twelve calendar months ending on the first day of May of each year : Provided that this subsection shall not apply to messages which originate or are delivered in any place outside the Colony.

The first of such payments shall be made on the 30th day of June, 1906, in respect of the period of twelve months ending on the preceding first day of May.

Section 4 of the same Clause (2) reads as follows :—

A sum of four thousand dollars (\$4,000) in respect of every wireless telegraph station or other means of communication by wireless methods of telegraphy between this Colony and any place, ship or vessel outside this Colony, for the time being belonging to or worked by or on behalf of the company which now is or hereafter shall be established in this Colony.

The first of such payments shall be made on the 30th day of June, 1906 : Provided that if the Governor in Council is satisfied that any such wireless telegraph station or other such means of communication is established for the purpose only of reporting passing ships or vessels, he may dispense the payment of such last-named sum and discharge the company from liability therefor in respect of such station or means of communication.

Clause 1 (1) of the Act of June 15th, 1905, Cap. XXI, reads :—

Whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that the Government of the Colony shall have control over the transmission of messages over any telegraph line, telephone line, or by any other form of telegraphy, it shall be lawful for the Governor in Council at any time to assume and for any length of time retain possession of any telegraph line, telephone, or any form of telegraphy in this Colony, and of all things necessary for the efficient working thereof, and may for the same time require the exclusive service of the operators and other persons employed in working such telegraph line, telephone, or any form of telegraphy ; and the company or other proprietor of such telegraph line, telephone

or any form of telegraphy, shall give up possession thereof, and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders and transmit and receive such despatches as they are required to receive and transmit by any officer duly authorised by the Governor in Council, and every company or other proprietor, operator or person violating any of the provisions of this section shall incur a penalty not exceeding one hundred dollars (\$100) for every refusal or neglect to comply with the requirements thereof, such penalty to be recovered by action in the name of the Minister of Finance and Customs, in a summary manner before a Stipendiary Magistrate or Justice of the Peace.

POST AND TELEGRAPH ACT, 1906.

B 1. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy, in any place in this Colony or on board any ship registered in this Colony, except under and in accordance with a licence granted in that behalf by the Postmaster-General, with the consent of the Governor in Council.

(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms, conditions, and restrictions on and subject to which the licence is granted, and any such licence may include two or more stations, places or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable on conviction in a summary manner before a Stipendiary Magistrate to a penalty not exceeding fifty dollars, and on conviction on indictment to a fine not exceeding five hundred dollars or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General.

(4) If a Stipendiary Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship as aforesaid without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, and named in the warrant, and a warrant so granted shall authorise the

officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) When a fine under this Act is imposed by a Court, Judge or Magistrate, and the master or owner of any ship is ordered to pay the same and the same is not paid at the time and in the manner prescribed, the Court, Judge or Magistrate making the order may, in addition to any other powers they may have for the purpose of compelling payment, direct the amount remaining unpaid to be levied by distress and sale of the ship, her tackle, furniture and apparel.

(6) The Postmaster-General may make regulations for prescribing the form and in which applications for licences under this Act are to be made, and, with the consent of the Governor in Council, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in "The Post and Telegraph Acts, 1891 to 1904," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

2. This Act shall be read with and form part of "The Post and Telegraph Acts, 1891 to 1904," and the said Acts and this Act may be cited as "The Post and Telegraph Acts, 1891 to 1906."

WIRELESS TELEGRAPHY (STEAMERS) ACT.

C The following Act respecting the provision of wireless telegraphy on steamers engaged in the trade of Newfoundland was passed on September 4th, 1914:—

1. Every steamer to which this Act applies shall be provided:—

(1) With a wireless telegraph installation approved of by the Minister of Marine and Fisheries;

(2) With at least one qualified wireless operator approved of by the Postmaster-General;

(3) With a Morse signalling apparatus approved by the Minister of Marine and Fisheries;

(4) With at least one person on board capable of operating such signalling apparatus and of reading signals from other ships.

2. The wireless telegraphy installation provided on a ship to which this Act applies shall be maintained in good order and shall be attended to by an operator qualified as aforesaid in accordance with rules and regulations to be made by the Governor in Council under this Act for the purposes thereof.

3. No steamer to which this Act applies shall receive a clearance at any Custom House for the Seal Fishery or otherwise unless and until the Collector is satisfied that the provisions of this Act in respect of said steamer have been complied with.

4. If any requirement of this Act is not complied with in the case of any steamer to which this Act applies, the master or owner shall be liable for each offence to a fine of twenty-five hundred dollars, to be recovered in a summary manner before a Stipendiary Magistrate.

5. This Act shall apply to any steamer which ordinarily is engaged in prosecuting

the Seal fishery from any port of this Colony, when engaged in the Seal fishery or when carrying more than sixty persons; and to any other vessel carrying passengers from or within this Colony when named by the Governor in Council in a Proclamation to be published in the *Royal Gazette*.

6. Nothing in this Act shall affect the obligation to obtain a licence for a wireless telegraphy installation under "The Postal and Telegraph Acts, 1891 to 1906," or prevent the Governor in Council or other person exercising a like control over such wireless telegraphy in times of war or otherwise as may be exercised in respect of other wireless telegraphy.

W. 19
D SHIP LICENCE No.
19....

COLONY OF NEWFOUNDLAND.

"LICENCE TO USE WIRELESS TELEGRAPHY."

Issued in accordance with the provisions of the London Convention, of 1912.

The herein named resident of is hereby licensed to establish and operate a wireless telegraph station on board the ship for the term or period commencing on the first day of April, nineteen hundred and and terminating on the thirty-first day of March, nineteen hundred and and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of one dollar, being the licence fee for the privilege above named.

This licence is subject to the following terms, conditions and restrictions:—

1. In this licence, the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction, that is to say:

The expression "marine signalling" means signalling by means of any system of wireless telegraphy between two or more ships, between ships and shore stations and any other wireless telegraph station, or between shore stations and ships.

2. (1) The licensee shall not establish, instal or operate any apparatus for wireless telegraphy, except the apparatus hereinafter called the "licensed apparatus," specified in the said schedule hereto.

(2) No tolls, fees or other consideration shall be received, levied or collected by the licensee until the same have been approved of by the Government of Newfoundland.

3. (1) The licensee shall so operate the licensed apparatus as not to interfere with the working of any wireless telegraph station established in Newfoundland, or with marine signalling on the waters or territory of Newfoundland or neighbouring waters or territory.

(2) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Postmaster-General and with all rules prescribed by the Postmaster-General for observance by his licensees:

(a) With respect to all arrangements to be adopted for the purposes of syntony or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station;

(b) With respect to any alternation of messages which the Postmaster-General may think necessary; and

(c) Generally with respect to avoiding interference between one wireless telegraph station and another.

(3) The licensed apparatus shall not, without the consent of the Postmaster-General, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

4. The licensee shall, if so required in writing by the Postmaster-General, cease to operate the licensed apparatus for such period (not exceeding hours in any one day) as may be specified by the Postmaster-General.

5. Subject to the provisions of this licence, and in accordance with the regulations issued from time to time by the Postmaster-General, the licensee shall transmit and receive messages by means of the licensed apparatus to and from any coast station or to and from any other ship without regard to the particular system of wireless telegraphy installed at such coast station or on such other ship, on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise.

6. The licensee shall not be obliged to transmit and receive commercial messages by means of the licensed apparatus to and from a ship station on a ship registered in a country which does not adhere to the International Radiotelegraphic Convention, unless instructed so to do by the Postmaster-General in his regulations.

7. (1) If and whenever any Department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus, any message on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Newfoundland or Canadian (Government vessels), such messages shall have priority over all other messages, and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages, and the rates to be charged on such messages shall not exceed half the rates charged the ordinary public.

(2) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

8. The licensee shall, so far as possible, receive from all other stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in his power.

9. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and transmitted by marine signalling or by any system of wireless telegraphy.

10. All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its places of origin and ultimate destination and such further particulars as the Postmaster-General shall from time to time reasonably require to be shown, messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and printed, and transcripts of messages and all other papers

for such period as is from time to time prescribed by the Regulations of the International Radiotelegraphic Convention, and such registers and message papers shall be open to the inspection of the Postmaster-General or his officers thereto authorised at the head office of the licensee, in between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a public holiday.

11. The Postmaster-General or his officers may, from time to time and at all reasonable times, enter upon the herein licensed station, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

12. The licensee shall prepare a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose by the Postmaster-General and shall forward the same to the Postmaster-General at the end of each month.

13. (1) The licensee shall observe at the station the provisions of the International Radiotelegraphic Convention as adhered to by His Majesty in respect of the Colony of Newfoundland and the detailed regulations from time to time made thereunder for carrying such provisions into effect.

(2) The licensee shall operate the licensed apparatus in accordance with any regulations which may be issued from time to time by the Postmaster-General.

14. Except with the consent in writing of the Postmaster-General the licensee shall not assign or sublet this licence.

15. The licensed apparatus at the said ship station shall be worked only by a person or persons holding a certificate or certificates issued by the Postmaster-General.

Certificates shall be granted to persons of such technical proficiency, and shall be in such form and subject to such conditions as the Postmaster-General may from time to time prescribe.

16. The licensees shall carry this licence on the ship on which the ship station is established under this licence, and also such documents as may be prescribed by the Postmaster-General, for the purpose of enabling the licensee to communicate with coast stations in accordance with the rules and regulations of the International Radiotelegraphic Convention of Berlin, 1906.

17. (1) If, and whenever, in the opinion of the Postmaster-General or any officer in command of one of His Majesty's ships of war, an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for the said Postmaster-General, by warrant under his hand, to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and, subject thereto, for such ordinary services as to the said Postmaster-General may seem fit, and in that event, any person authorised by the said Postmaster-General may enter upon the stations of the licensee, and take possession thereof and use the same as aforesaid.

(2) The Postmaster-General or any officer in command of one of His Majesty's ships of war may when he considers such an emergency

as aforesaid to have arisen, instead of taking possession of the stations of the licensee, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus, either wholly or partly and in such manner as he may direct, and such persons may enter upon the licensee's premises accordingly, or the said Postmaster-General or officer may direct the licensee to submit to him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said Postmaster-General or officer may prescribe, and the licensee shall obey and conform to all such directions.

3. In any such case as aforesaid, if the licensee shows that during the exercise of any of the powers aforesaid, his receipts for the licensed apparatus with respect to which the said powers have been exercised have been less than his receipts from the same source during a corresponding period, the Government shall pay to the licensee, as compensation for any loss of profit sustained by the licensee by reason of the exercise by the Postmaster-General of any of the powers hereby reserved, such sum as may be settled between the Postmaster-General and the licensee by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Postmaster-General are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and, save with the consent of the Postmaster-General no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing direct or suspected communication with any of His Majesty's enemies or of protecting the interests of His

Majesty under the apprehension of impending war.

18. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case, the Postmaster-General may, by writing revoke and determine these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

19. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General, from time to time, to establish, extend, maintain and work any system or systems of wireless telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Postmaster-General, from time to time, to enter into agreements for or to grant licenses relative to the working and user of wireless telegraphs (whether of a like nature to those hereby licensed or otherwise), or the transmission of messages in any part of Newfoundland, by means of wireless telegraphy, with or to any person or persons whosoever upon such terms as he shall, in his discretion, think fit.

20. Any notice, request or consent (whether expressed to be in writing or not), to be given by the Postmaster-General under these presents may be under the hand of any authorised officer, for the time being, of the Newfoundland Postal Telegraph Department and may be served by sending the same by registered letter to the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered letter addressed to the Postmaster-General, St. John's, Newfoundland.

Name of Station.	Normal Range.	Description of Receiving Apparatus.	Wave-length	Source of Power and Maximum Output.	Maximum Power taken by Transmitting Instruments.		Frequency of Alternator, if any.	Ship Charge.
					Volts.	Amps.		

.....
Minister of Posts and Telegraphs.

DEPARTMENT OF THE POSTAL TELEGRAPHS,
NEWFOUNDLAND.

Dated at St. John's this.....day of

.....19.....

PROVISIONAL WIRELESS OPERATOR'S CERTIFICATE.

E This is to certify that the bearer..... resident of..... is a British subject and is certified by the local Superintendent of the Marconi Wireless Telegraph Company of Canada to have the necessary technical proficiency for the position of wireless operator having acted as such on

the steamer.....plying upon the territorial waters of Newfoundland from..... to.....

He has subscribed to the Oath of Secrecy and understands that this certificate is a provisional one, valid for not more than six months from the date of issue inscribed hereon.

Issued in accordance with the London Convention, 1912, and the Wireless Telegraphy (Steamers) Act, 1914, Newfoundland Legislature, and regulations made thereunder.

General Post Office,

St. John's, Newfoundland.

.....day of.....

.....
Minister of Posts and Telegraphs,
Newfoundland.

NEW GUINEA

(See map on p. 139.)

NEW HEBRIDES

(See PACIFIC ISLANDS.)

NEW ZEALAND

THE Dominion of New Zealand lies about 1,200 miles south-east of the mainland of Australia, and consists of three main islands in the South Pacific Ocean, known as the North, South, and Stewart Islands. They stretch between 33° 0' and 53° 0' S. latitude; their longitude varying from 160° 0' E. to 173° 0' W. The Colony includes several groups of smaller islands, and lying at some distance from those which form the centre of the Dominion.

The initial discovery is attributed to the Dutch explorer, Abel Jansen Tasman, who visited the South Island on December 13th, 1642. The first settlement of Europeans was made in 1814, British sovereignty was proclaimed in 1840, and the independence of the Colony dates from May 3rd, 1841. The constitution rests upon the Act of 1852, under which the Executive authority is vested in a Governor-General assisted by a Council of Ministers with a legislature of two houses.

CONTROL.

The Post and Telegraph Department is responsible for the administration of wireless telegraphy in New Zealand. The permanent head of this Department is the Secretary of the General Post Office at Wellington.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Hon. Mr. J. G. Coates	Postmaster-General and Minister of Telegraphs.	Wellington
Mr. R. B. Morris	Secretary, Post and Telegraph Department	Wellington
Mr. A. T. Markman	First Assistant Secretary	Wellington
Mr. G. McNamara	Assistant Secretary	Wellington
Mr. E. A. Shrimpton, M.I.E.E. ..	Chief Telegraph Engineer	Wellington
Mr. A. Gibbs, A.M.I.E.E. ..	Assistant Telegraph Engineer	Wellington
Mr. H. A. Huggins	Controller of Savings Bank and Accounts	Wellington

No licences are granted for amateur or experimental stations in New Zealand, and the erection of such stations is prohibited.

ORGANISATION.

The first wireless installation was placed in the tower of the General Post Office at Wellington in June, 1910, and experiments were carried out with different wireless systems. Later on a "Telefunken" set was installed, and a wireless telegraph office opened for commercial work on July 26th, 1911. At that time there were not more than half a dozen ships fitted with wireless apparatus trading to the Dominion; now quite a number of New Zealand ships carry wireless apparatus, as well as a large number of vessels registered in other countries and trading to New Zealand ports.

On October 14th, 1912, the G.P.O. station was replaced by one of $2\frac{1}{2}$ -kw. upon Mount Wakefield, immediately behind the City of Wellington. At this station, known as "Radio-Wellington," a continuous service is maintained.

On October 24th, 1912, a $2\frac{1}{2}$ -kw. station was established on the roof of the Post Office at Auckland. The normal range of these $2\frac{1}{2}$ -kw. stations is 300 miles by day and 600 miles by night.

The installation of a wireless set of 2½-kw. power of the Government cable steamer *Tutanekai* was completed on June 20th, 1912. The equipment has been found to be of much service in aiding in the work of the repair of submarine cables.

A wireless station was opened at CHATHAM ISLANDS on September 18th, 1913, connecting this group of islands with the mainland of New Zealand and extending the range of communication eastward.

The high-power stations at Awanui and Awarua were opened for public business on December 18th, 1913. These stations are of 30 kw. primary power Telefunken system, and were undertaken primarily for defence purposes. They are required to communicate with Sydney during the day as well as at night.

At the present time five stations in New Zealand are open for public service with ships.

ADMINISTRATION.

In July, 1914, regulations were made for the control of ships carrying wireless telegraph apparatus while within the territorial waters of New Zealand. The Regulations relating to ship stations were also amended by new Regulations issued on September 7th, 1914.

A—Extracts from the Post and Telegraph Act (Part X), 1908.

B—Extracts from Amendment Acts of 1911 and 1913.

C—Regulations under Act of 1913. (Ships not registered in New Zealand.)

D—Regulations (affecting ships registered in New Zealand).

E—Regulations as to ships being provided with Wireless (October, 1913).

F—Form of Ship License.

POSTS AND TELEGRAPHS ACT.

A The following extracts from Part X of the Post and Telegraph Act, 1908, and from the Post and Telegraph Amendment Acts, 1911 and 1913, relate to wireless telegraphy in the Dominion:—

162. The Governor may from time to time establish stations for the purpose of receiving and transmitting telegraph messages within New Zealand or between New Zealand and parts beyond New Zealand by what is commonly known as "wireless telegraphy," including in that expression every method of transmitting messages by electricity otherwise than by wires, whether such method is in use at the time of the coming into operation of this Act, or is hereafter discovered or applied.

163. The provisions of Part VII of this division of this Act shall, as far as is applicable, *mutatis mutandis*, extend and apply to stations established under this part of this Act, and to communications by wireless telegraphy.

164. Every person who erects, constructs, or establishes any station or plant capable of transmitting or receiving wireless telegraphic signals without having first obtained the consent of the Governor in Council is liable to a fine not exceeding five hundred pounds, and any plant, machinery, instruments, and material used by him for such purpose may be forfeited and dealt with as the Minister directs.

Part VII of this division of the Act referred to deals with the construction and regulation of electric lines. It authorises the Governor to establish electric lines and purchase lines and plant. He may make regulations as to the management, working and maintenance of any telegraph. Any officer or person employed in the working of any telegraph who improperly divulges the contents of any telegram transmitted or presented for trans-

mission by such telegraph, or the purport of such telegram, is liable to a fine not exceeding one hundred pounds, or to imprisonment with hard labour for any period not exceeding six months.

EXTRACTS FROM AMENDMENT ACTS OF 1911 AND 1913.

POST AND TELEGRAPH (AMENDMENT) ACT, 1911.

B 3. (1) The Minister of Telegraphs may, in accordance with regulations to be made in that behalf by the Governor in Council, grant licences for the installation and working of apparatus for wireless telegraphy (within the meaning of Part X of the principal Act) on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters.

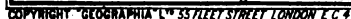
(2) Subject to any such regulation, every such licence shall be in such form and for such period, and shall contain such terms, conditions, and restrictions, as the Minister of Telegraphs thinks fit.

(3) The Governor may by Order in Council make such regulation as he thinks proper as to the granting of such licences, and as to the form, period, terms, conditions, and restrictions thereof and as to the fees payable in respect thereof.

POST AND TELEGRAPH (AMENDMENT) ACT, 1913.

9. (1) The Governor may from time to time, by Order in Council, make such regulations as he thinks proper governing the use of wireless telegraph apparatus on merchant ships whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand.

(2) Such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made pending the institution and determination of



proceedings in respect of such breach and the recovery of any fine imposed in respect thereof.

REGULATIONS UNDER ACT OF 1913.
AFFECTING SHIPS NOT REGULATED IN NEW ZEALAND.

C The following regulations are for the control of ships carrying wireless telegraph apparatus while within territorial waters of New Zealand.

Whereas by Section 9 of the Post and Telegraph Amendment Act 1913 (hereinafter termed "the said Act"), it is provided that the Governor may from time to time by Order in Council make such regulations as he thinks proper governing the use of wireless telegraph apparatus on merchant ships, whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand, and that such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made pending the institution and determination of proceedings in respect of such breach and the recovery of any fine imposed in respect thereof:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority conferred upon him by the said Act, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations; and doth hereby order that such regulations shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette*.

FURTHER REGULATIONS.

1. In these regulations, if not inconsistent with the context:—

"Territorial waters of New Zealand" means and includes all tidal waters included within the Dominion of New Zealand, and all parts of the open sea within one marine league of the coasts of that Dominion measured from low-water mark.

"Minister of Telegraphs" means the Minister of Telegraphs for the time being.

"Wireless Telegraphy" has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

"Telegraph" has the same meaning as in Section 119 of the Post and Telegraph Act, 1908.

"Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station, whether a coast station or a ship station.

"The Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

"Coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

"Ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. These regulations shall apply only to foreign merchant ships and to British merchant ships not registered in New Zealand, while such British or foreign ships are within the territorial waters of New Zealand.

3. All apparatus for wireless telegraphy on board a merchant ship while in the territorial waters of New Zealand shall be worked in such a way as not to interfere with Naval signalling, or with the working of any wireless telegraph station lawfully established, installed or worked in the Dominion of New Zealand or the territorial waters thereof; and, in particular, the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless telegraph stations established on ships at sea and wireless telegraph coast stations.

4. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any of the harbours of the Dominion of New Zealand, except with the consent in writing of the Minister of Telegraphs.

5. The foregoing regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

6. If and whenever an emergency shall have arisen in which it is expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the said apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the said apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer or person may seem fit; and in that event any person authorised by the said officer or person may enter upon any ship on which such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

7. Any such officer or person may in such event as aforesaid, instead of taking possession of the said apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the said apparatus, either wholly or partly, and in such manner as he may direct, and such persons may enter upon any ship on which the said apparatus is installed accordingly; or the said officer or person may direct the person or persons in charge of the said apparatus to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the said apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages, or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may prescribe, and the said person or persons in charge of the said apparatus shall obey and conform to all such directions.

8. If any breach of these regulations is committed by any person on board any ship while in the territorial waters of New Zealand, the person so committing the same and the owner and master of the ship shall be severally liable on summary conviction to a fine not exceeding £100.

9. Whenever the Minister of Telegraphs or the Secretary of the Post Office has reasonable cause to believe or suspect that any breach of these regulations has been committed on board any ship while in the territorial waters of New Zealand, he may give notice in writing to the Collector of Customs at any port in New

Zealand to detain the ship, under Section 9 of the Post and Telegraph Amendment Act, 1913, until the sum of £100, or such smaller sum as may be specified in the notice, has been deposited with the collector by or on behalf of the owner of the ship.

10. If on the receipt of that notice, or at any time within three months thereafter, the ship is found within such port, the Collector of Customs shall withhold the certificate of clearance of the ship, under Section 35 of the Customs Act, 1913, until and unless the aforesaid sum is deposited with him or the aforesaid notice of detention is withdrawn.

11. If within six months after the date of the offence in respect of which the ship has been detained a conviction for that offence is obtained against any person, the sum so deposited shall be available for the satisfaction of any fine and costs imposed or awarded by the conviction, and the residue, if any, shall be returned to the person by whom the deposit was made.

12. If within the period of six months aforesaid no such conviction is obtained, the sum so deposited shall be returned to the person by whom it was deposited.

WIRELESS TELEGRAPH REGULATIONS FOR SHIP STATIONS.

AFFECTING SHIPS REGISTERED IN NEW ZEALAND.

D Whereas by Order in Council dated the twentieth day of November, one thousand nine hundred and eleven and published in the *New Zealand Gazette* of the twenty-third day of November, one thousand nine hundred and eleven, regulations were made under the authority of the Post and Telegraph Amendment Act, 1911 (hereinafter termed "the said Act"), as to the granting of licences for the installation and working of apparatus for wireless telegraphy on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters, and as to the form, period, terms, conditions, and restrictions thereof, and as to the fees payable in respect thereof: And whereas it is desirable to revoke such regulations, and to make others in lieu thereof.

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority conferred upon him by the said Act, and of all other powers and authorities in that behalf enabling him, and acting by and with the advice and consent of the Executive Council, of the said Dominion, doth hereby revoke the regulations made by the above-mentioned Order in Council, and in lieu thereof doth hereby make the following regulations for the purposes hereinbefore mentioned; and doth hereby order that such regulations and the revocation of the regulations first before recited shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette*.

REGULATIONS.

1. In these regulations, if not inconsistent with the context:—

"Minister of Telegraphs" means the Minister of Telegraphs for the time being.

"Wireless Telegraphy" has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

"Telegraph" has the same meaning as in

Section 119 of the Post and Telegraph Act 1908.

"Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station, whether a coast station or a ship station.

"The Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

"The International Telegraph Convention" and the "International Telegraph Regulations" means respectively the International Convention of St. Petersburg dated the 10th-22nd July, 1875, and the service regulations made thereunder; and include respectively any modifications of the convention or regulations made from time to time.

"The Radiotelegraph Convention, 1912," means the convention signed at London on the 5th day of July, 1912, and the service regulations made thereunder; and includes any modification of the convention or regulations made from time to time.

"Coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

"Ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. The Minister of Telegraphs may, at the request of any person or company desirous of establishing, installing, working, and using on ships belonging to such person or company, and registered in New Zealand, apparatus for wireless telegraphy, grant to such person or company (hereinafter called "the licensee") a licence, in the form of the Schedule hereto, for the period, upon the terms, and subject to the conditions and restrictions hereinafter appearing.

3. Each ship station is bound to exchange radiotelegrams with any coast station, or with any other ship station, without distinction as to the radiotelegraph system adopted by that station.

4. Each ship station shall be of such class mentioned in Article 13 of the Service Regulations annexed to the Radiotelegraph Convention, 1912, as is specified in the licence issued in respect thereof, and the equipment of the station, hours of duty observed, and other requirements shall be appropriate to such class in accordance with the provisions of the Radiotelegraph Convention, 1912.

5. The apparatus used at all ship stations shall, as far as possible, be in keeping with scientific and technical progress. The waves emitted must be as pure and as little damped as possible.

6. The apparatus must be capable of transmitting and receiving at a speed of at least equal to twenty words per minute, the word being reckoned at the rate of five letters.

7. The apparatus shall be so constructed as to be capable of using wavelengths of 600 to 300 metres as measured by the standard of measurement in use by the Post and Telegraph Department for the time being; and such other wavelengths not exceeding 600 metres as shall be authorised from time to time by the

Minister of Telegraphs; Provided always that the wavelength of 600 metres shall normally be used for communication, and, further, that the wavelength of 1,800 metres may be used for transmission in the exceptional case referred to by Article 35 (2) (a) of the Service Regulations annexed to the Radiotelegraph Convention, 1912; Provided, further, that only wavelengths of 600 metres shall be used by the licensee during the period of any war in which the United Kingdom is engaged.

8. The licensed apparatus shall not be used by the licensee, or by any other person either on behalf or by permission of the licensee, for the transmission or receipt of messages except messages authorised by these regulations; and the licensee shall not, except with the consent in writing of the Minister of Telegraphs, send or receive messages from or at the licensed apparatus when in any harbour in the Dominion of New Zealand.

9. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus, interfere with naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship station is inconsistent with the free use of naval signalling, the licensee shall, when required in writing by the Minister of Telegraphs so to do, close the said station.

(3) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of the licence.

10. The licensee shall observe the International Telegraph Convention and International Telegraph Regulations so far as the said convention and regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

11. The licensee shall observe the provisions of any regulations from time to time made under the provisions of the Post and Telegraph Act, 1908, and its amendments, by the Governor in Council or by the Minister of Telegraphs in relation to the conduct of wireless telegraph business, so far as the same are applicable to the licensee.

12. The licensee shall observe the provisions of the Radiotelegraph Convention, 1912.

13. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Minister of Telegraphs from time to time for the purpose of preventing interference with the working of any other wireless telegraph station, and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

14. The licensed apparatus shall not, without the consent of the Minister of Telegraphs be altered or modified in respect of any of the particulars referred to in the licence issued in respect thereof, and such apparatus shall at all times be maintained in good working order.

15. Except as provided in these regulations, the licensee shall transmit messages by means of the licensed apparatus on equal terms, without favour or preference, whether as regards rates of charge, order of transmission, or otherwise.

16. The licensee shall, so far as possible, receive from ships and light stations all requests

for assistance and all signals of distress, and shall answer such requests and signals and retransmit them with the least possible delay, and with priority over all other messages to the proper authorities by means of the licensed apparatus or by any other means in the power of the licensee.

17. The licensed apparatus at ship stations shall be worked only by a person or persons holding a certificate or certificates issued or recognised by the Minister of Telegraphs. Certificates shall be granted to persons of British nationality possessing the qualifications prescribed by the Radiotelegraph Convention, 1912, and shall be in such form and subject to such conditions, directions, or rules as the Minister of Telegraphs shall from time to time prescribe: and such certificates may at any time be withdrawn at the discretion of the Minister of Telegraphs in case of misconduct, or breach on the part of the holder of the Radiotelegraph Convention, 1912, or of any conditions, directions, or rules prescribed by the Minister of Telegraphs for the guidance of operators or for the working of such ship stations.

18. (1) The licensee, his servants and agents, shall not divulge the contents or the purport of the contents of any message, or make any use whatever of any message coming to his or their knowledge, other than to the addressee or his authorised agent, or to properly authorised officials of His Majesty's Government or of the Minister of Telegraphs, or to a competent legal tribunal.

(2) The licensee shall render to the Minister of Telegraphs such accounts as the Minister of Telegraphs shall direct in respect of all charges due or payable under the Radiotelegraph Convention, 1912, in respect of messages exchanged between the licensed ship stations and coast stations, and shall pay to the Minister of Telegraphs, at such times and in such manner as the Minister of Telegraphs shall direct, all sums which shall be due from the licensee under such accounts.

19. The licensee shall keep full accounts, records, and registers of all messages transmitted by means of the licensed apparatus; and in such registers each of such messages shall be accompanied by its identifying number and date, and full particulars of its place of origin and of ultimate destination, and such further particulars as the Minister of Telegraphs shall from time to time reasonably require to be shown. The licensee shall preserve all used message forms written and printed, and transcripts of messages, and all other papers for such period as is from time to time prescribed by the Radiotelegraph Convention, 1912, and, in default of any provisions on the subject in the said convention, for such period as is from time to time prescribed by the International Telegraph Regulations; and such registers and message papers shall be open to the inspection of the Minister of Telegraphs or his authorised officers.

20. The Minister of Telegraphs, and any agent authorised in that behalf in writing by him, may at all reasonable times enter upon any licensed ship station for the purpose of inspecting, and may inspect, any apparatus fixed or being in such station for the purpose of sending and receiving messages by wireless telegraphy, and all other telegraphic instruments and apparatus fixed or being in such station, and the working and user of such apparatus and telegraphic instruments.

LICENCE FOR THE INSTALLATION AND WORKING OF APPAR

Name of Ship on which Station established.	Class of Ship Station under the Radio- telegraph Convention, 1912.	Call Signal.	Nature of Services Performed.	Hours of Service.	Normal Range of Signalling in Nautical Miles.	
					By Night.	By Day.
(1)	(2)	(3)	(4)	(5)	(6)	(7)

21. The licensee shall carry on every ship on which a ship station is established a print or copy of the licence, certified under the hand of an appropriate officer of the Minister of Telegraphs to be a true copy, and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls, and also such documents as may be prescribed by the Minister of Telegraphs for the purpose of enabling the licensee to communicate with coast stations and ship stations, in accordance with the Radiotelegraph Convention, 1912.

22. (1) Every licence shall be in force from the date of the granting thereof until the 31st December of the year in which it is issued, and no longer; but may be renewed from year to year.

(2) The licensee shall pay to the Minister of Telegraphs for and in respect of the licence granted, and of every renewal thereof, a royalty of 5s. in respect of each ship station included in the licence.

(3) All royalties payable under any licence shall be payable on the date of the granting or renewal thereof, as the case may be.

23. Except with the consent in writing of the Minister of Telegraphs, the licensee shall not assign, underlet, or otherwise dispose of or admit any other person or body to participate in the benefit of any licence.

24. If and whenever an emergency shall have arisen in which it is expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer or person may seem fit; and in that event any person authorised by the said officer or person may enter upon any ship on which any such appa-

ratus is installed and take possession of the said apparatus and use the same as aforesaid.

25. Any such officer or person may in such event as aforesaid, instead of taking possession of the licensed apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct, and such persons may enter upon any ship on which any apparatus is installed accordingly; or the said officer or person may direct the licensee, his servants or agents, to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the licensed apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may prescribe, and the licensee, his servants or agents, shall obey and conform to all such directions.

26. In any of the following cases, that is to say:—

(a) In case any sum of money which ought to be paid by the licensee to the Minister of Telegraphs under or by virtue of these regulations shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained; or

(b) In case of any breach, non-observance, or non-performance by or on the part of the licensee, his servants or agents, of any of the provisions (other than a provision for the payment of money) or conditions herein contained,—

then and in any such case the Minister of Telegraphs may, by notice in writing, revoke and determine the licence as to all or any of the ship stations thereby licensed, and thereupon the said licence shall absolutely cease, determine, and become void as to all or any of the said ship stations, as the case may be, but without prejudice to any right of action or

DULE.

TUS FOR WIRELESS TELEGRAPHY ON BOARD SHIPS OWNED BY

Character of Apparatus.		Power.		
System of Radiotelegraphy with the Characteristics of the System of Emission.	Wave-lengths (in Metres).	Source and Maximum Output.	Maximum to be normally taken by Sending Instruments.	If Alternator is used. Number of Cycles per Second.
(8)	(9)	(10)	(11)	(12)

remedy which shall have accrued to His Majesty under these regulations or otherwise.

27. Nothing in these regulations shall prejudice or affect the right of the Minister of Telegraphs from time to time to establish, extend, maintain, and work any system or systems of telegraphic communication (whether of a like nature to those licensed hereunder or otherwise) in such manner as he shall in his discretion think fit. Neither shall anything herein contained prejudice or affect the right of the Minister of Telegraphs from time to time to enter into agreements for or to grant licences relative to the working and use of telegraphs (whether of a like nature to those licensed hereunder or otherwise) or the transmission of messages in any part of New Zealand by means of wireless telegraphy, or by any other means, with or to any person or persons whomsoever, upon such terms as he shall in his discretion think fit. And (save as in these regulations expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Minister of Telegraphs by or under the Post and Telegraph Act, 1908.

28. Any notice, request, or consent (whether required to be in writing or not) to be given by the Minister of Telegraphs under these regulations may be under the hand of the Secretary for the time being of the Post and Telegraph Department, and may be served by sending the same in a registered letter addressed to the licensee at the office or place of residence for the time being of the licensee, or, if such notice, request, or consent relates to any particular ship station, by delivery to the master of the ship upon which such station is installed; and any notice to be given by the licensee under these regulations may be served by sending the same in a registered letter addressed to the Secretary, General Post Office, Wellington.

29. All licences heretofore issued under the regulations hereby revoked shall continue in force, subject to the regulations under which they were issued, until the expiry of the current

term thereof, but shall not be capable of renewal under the regulations so revoked.

**REGULATIONS
AS TO SHIPS BEING PROVIDED WITH WIRELESS
TELEGRAPHY APPARATUS.
ORDER IN COUNCIL.**

E At the Government House, at Wellington, this twentieth day of October, 1913.

Whereas it is enacted by Section 50 of the Shipping and Seamen Amendment Act, 1909, that the Governor may from time to time by Order in Council make regulations requiring ships registered in New Zealand, and carrying passengers, to be provided with apparatus for transmitting messages by means of wireless telegraphy, and may by such regulations prescribe fines not exceeding fifty pounds for any breach thereof by the owner or master of a ship. And whereas it is desirable to make such regulations:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in exercise of the hereinbefore recited power and authority, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations, and doth hereby order that they shall come into force on July 1st, 1914:

Provided that, if in his opinion the circumstances justify it, the Minister of Marine may exempt any steamship from the operation of these regulations, and may limit the time for which any such exemption shall be in force.

REGULATIONS.

1. Every steamship registered in New Zealand, and carrying passengers, which is engaged in the foreign or inter-colonial trade, except steamships trading to the Chatham, Auckland, Campbell, and Antipodes Islands, and every home trade steamship which is authorised by her ordinary survey certificate to carry not less than 150 passengers at sea, shall not leave or attempt to leave any port in



NICARAGUA

THIS Central American State lies between Costa Rica on the south and Honduras on the north. Its area is estimated at 49,200 square miles, and it possesses a coast line of about 300 miles on the Atlantic, whilst that on the Pacific Ocean stretches for about 200 miles.

The present constitution came into force on April 5th, 1913. It vests the executive functions in a President, and the legislative power in a Congress of two houses. On February 18th, 1916, a treaty between Nicaragua and the United States was ratified, which laid down the conditions for the acquisition by the latter of naval bases on the Pacific and Atlantic coasts and of the projected canal route.

CONTROL.

The control of any stations which the Government might establish on its own account would be vested in the Minister of Progress and Public Works (*Ministerio de Fomento*) and the Postmaster-General.

ORGANISATION.

With regard to wireless telegraphy, none of the installations at present existing in Nicaragua is owned by the Government. The United States Government possesses a station in Managua, the capital of the Republic, and there are two stations owned by private companies on the Atlantic Coast. These stations (with the exception of that owned by the American Government) have been erected under contract with the Government of the Republic, and are subject to the provisions of the London Radiotelegraphic Convention of 1912. Only one of them is open to public service with ships.

A small station has also been erected at the Eden Mines in Pis Pis mining district at the expense of the company, and is used exclusively by the firm.

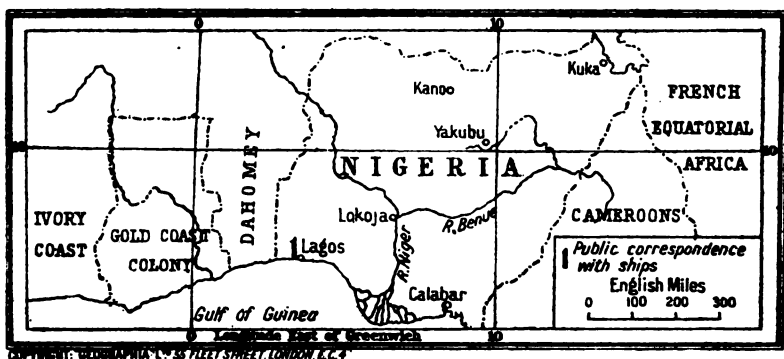
ADMINISTRATION.

No special legislation bearing on the subject has been promulgated in the country. The above-mentioned convention constitutes the only law at present applicable to Nicaragua in the case of wireless telegraphy.

NIGERIA

THIS territory comprises the Colony and Protectorate of Nigeria and the approximate area is 336,000 square miles.

The Colony is practically identical with the old Colony of Lagos, and comprises an area of 1,400 square miles. The Protectorate is divided into the Northern and Southern Provinces, which almost coincide with the old Protectorate of Northern and Southern Nigeria.



The Governor and Commander-in-Chief of the Colony is *ex officio* the Governor and Commander-in-Chief of the Protectorate. The Northern and Southern Provinces are each administered by a Lieutenant-Governor. The Colony is administered by the Lieutenant-Governor of the Southern Province.

An Executive Council advises the Governor both for the Colony and Protectorate. The Legislative Council confines its operation to, and considers, the laws and estimates of the Colony. The Nigerian Council is an advisory and deliberate body.

CONTROL AND ORGANISATION.

There is only one wireless station in Nigeria—at Lagos—and this was erected by the African Direct Telegraph Company in 1912. It is open to public service with ships. The Postmaster-General controls the wireless services.

ADMINISTRATION.

Wireless telegraphy is administered under:—

A—The Wireless Telegraph Ordinance, 1916.

B—Regulations made under the Ordinance of 1916.

THE WIRELESS TELEGRAPHY ORDINANCE, 1916.

A 1. *Short Title.*—This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1916.

2. *Definition.*—Definition: "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received.

3. *Licence for Wireless Telegraphy.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in Nigeria except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. *Apparatus Aboard Ships to be Worked in Accordance with Regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of Nigeria, otherwise than in accordance with regulations made under this Ordinance.

5. *Regulations.*—(1) The Governor may make regulations for carrying into effect the purposes of this Ordinance.

(2) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of Nigeria shall be subject to such further Regulations as may be made by the Governor and such Regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. *Search Warrant.*—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf, or contrary to the provisions of any Regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by a superior officer and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the

station, place or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. *Penalties and Procedure.*—Any person who shall offend against any provision of this Ordinance or any of the Regulations made thereunder shall be liable to a fine of fifty pounds, and the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. *Saving Section as Regards Electrical Apparatus.*—Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than that of wireless telegraphy.

9. *Repeal No. 12 of 1913 of Southern Nigeria and Chapter 55 of the Laws of Northern Nigeria.*—The Wireless Telegraphy Ordinance, 1913, and the Wireless Telegraphy Proclamation are hereby repealed.

REGULATIONS MADE UNDER THE WIRELESS TELEGRAPHY ORDINANCE, 1916.

B The following Regulations are made by His Excellency the Governor-General under and by virtue of the provisions of section 5 of the Wireless Telegraphy Ordinance, 1916 :—

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of Nigeria shall be worked in such a way as not to interfere with :—

- (a) Naval signalling, or
- (b) the working of any wireless telegraph station lawfully established, installed or

worked in Nigeria or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay or waters of Nigeria except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Made by His Excellency the Governor this 10th day of November, 1916.

NORWAY

THE most westerly of the Scandinavian nations emerged from the obscurities of myth and legend in the ninth century, and, after a vigorous separate national existence, was united with Sweden and Denmark under Queen Margaret by the Union of Kalmar in 1397. In 1814 Norway separated from Denmark, and Charles XIII of Sweden established his rule over the two countries. This co-partnership endured until the peaceful revolution of 1905 restored to the Norwegians their complete independence.

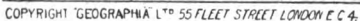
Norway covers an area of 124,130 square miles, and is ruled by a King with the co-operation of the Norwegian Parliament, which bears the historic title of "Stor-thing." Its capital is Christiania, picturesquely situated on a fjord, which owes its patronymic to the city.

CONTROL.

Radiotelegraphy is organised under the supervision of the Telegraph Department; whilst for naval and military purposes the War Office and Admiralty exercise jurisdiction over their own wireless section.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Colonel T. Heftye..	Telegraph Department : Director-General of Telegraphs	Christiania
Mr. H. Petersen ..	Radio Engineer and Chief of Wireless Department	Christiania (Telegraph Department)
Capt. H. Nickelsen	Director of Wireless Department of the Navy	Horten (Navy Yard)
Comdr. F. Bugge	Inspector Wireless Department of the Navy..	Horten (Navy Yard)



ORGANISATION.

The first wireless stations to be erected and opened for public correspondence were those at Sörvaagen and Röst, both completed in 1906. Radiotelegraphic communication was established in 1911 between Norway and Spitzbergen, and has been maintained ever since. The important Transatlantic long-distance station at Stavanger is now completed, whilst at Christiania another high-power installation has been erected for communication with the northern part of the country and abroad.

The latest available statistics enumerate :—

Stations for public service to ships	7
Stations for Government traffic only	2
Stations for public restricted service	2
Stations for Transatlantic public traffic	1
Stations under construction	3
Installations on Norwegian merchant vessels ..	about 300

A Norwegian company has been formed under the title of "Norsk Marconi Kompani A/S" at Christiania. This company is working in conjunction with Marconi's Wireless Telegraph Co., Ltd., London, and has the sole rights of the Marconi patents for Norway. The company intends to start a factory for the manufacture of wireless apparatus, etc.

The technical manager of the new company is Commander B. Gottwaldt, of the Royal Norwegian Navy, and the commercial management is in the hands of Messrs. Storm & Bull, Ltd., of Christiania.

There are at present no wireless clubs or societies.

ADMINISTRATION.

The Laws and Regulations under which wireless is administered in this country appear in the following pages in accordance with the list appended hereto :—

- A**—Law of July 24th, 1914.
- B**—Law of August 18th, 1914.
- C**—Regulations.
- D**—Ship Licence.
- E**—Certificate for Wireless Telegraphists.
- F**—Notice to Mariners.
- G**—Royal Proclamation Prohibiting Wireless in Territorial Waters, dated June 2nd, 1917.

LAW OF JULY, 1914.

A Law of July 24th, 1914, supplementing and amending the Law of April 29th, 1899, relating to the forwarding of communications by aid of telegraphic conductors or such like installations and relating to the repeal of Law No. 2 of July 16th 1907 :—

Section 1.—On ships which sail under the Norwegian flag and which do not belong to the Norwegian Navy, stations or installations for telegraphing or telephoning by wireless both within and without the boundaries of the Kingdom may only be installed and worked after an authorisation obtained in advance, which will be granted by the King, or whoever may be authorised thereto, on certain definite conditions for a stipulated period of time. The permission may at any time be withdrawn if the conditions imposed are not adhered to.

Detailed Rules and Regulations relating to the fitting up and working of such stations or installations shall be drawn up by the King.

On ships which sail under a foreign flag and

are within Norwegian territorial waters wireless telegraphing and telephoning can only be carried on—even if they have permission for same from the authorities of the foreign country—subject to observance of the provisions which are made with respect thereto by the King or whomsoever he may have authorised for the purpose, who may, moreover, forbid all telegraphing or telephoning from such ships, whenever circumstances may be considered to require it.

Section 2.—The exceptions mentioned in the Law of April 29th, 1899, under Section 1, 2nd paragraph, relating to the working of plant which may be used by a commune or private person for his own use, or such as railways may instal for their own working, shall not apply so far as the working of installations for wireless telegraphy or telephony are concerned.

Section 3.—Any infractions of the aforementioned conditions shall be punished pursuant to the provisions laid down in the Law of April 29th, 1899, Section 6.

Moreover, any transgression of the rules or provisions which are drawn up with regard to Section 1 of the present Law shall be punished by fines.

Section 4.—This Law shall come into force immediately. The Law of July 16th, 1907, containing additions and amendments to the Law of April 29th, 1899, relating to the forwarding of communications by means of telegraph lines or similar installations, is hereby repealed.

LAW OF AUGUST, 1914.

B The following paragraph, taken from the "Law of August 18th, 1914," amending the Law of April 29th, 1899, relates directly to Wireless Telegraphy:—

Within the boundaries of Norway, or its territorial waters, stations and installations for wireless telegraphy and telephony may only be erected or worked after permission has been obtained from the King or whomsoever he may authorise thereto, and on such conditions as are laid down in the said permission.

REGULATIONS.

C The following regulations are based on the Law of July 24th, 1914:—
1. No radiotelegraphic station on board a foreign vessel within the limits of Norwegian territorial waters can be used without a special licence.

Application for such licence must be made to the Ministry of Telegraphs, which Ministry, after consultation with the Ministry of Marine, will decide on the application.

2. The licence granting the right to use wireless telegraph stations within the radius of Norwegian territorial waters may be limited to definite places and to fixed hours of the day.

Wireless transmission of messages must be stopped immediately on the order of the Ministry of Telegraphs, Ministry of Marine, or of any coast station established by the aforesaid Ministries.

3. If the vessel is in a Norwegian port situated within a radius of 5 kilometres from the nearest telegraph station, the station on board the vessel cannot communicate either with Norwegian coast stations or with foreign coast stations.

Without a special licence, a wireless station on board a vessel in a Norwegian port cannot be used for the exchange of messages with other ship stations unless for the purpose of advising accidents.

4. However, the preceding provisions do not apply to foreign ships of war, as far as the interchange of messages between themselves is concerned.

It is the duty, nevertheless, of stations on board foreign warships to conform to the provisions in Article 2, Paragraph 2, above.

5. If a station is used when a ship is in Norwegian territorial waters this station must conform to the provisions of the International Telegraphic Convention and the regulations appended thereto.

NORWEGIAN LICENCE CONDITIONS.

D *Conditions for erection and working of Radiotelegraph and Radiotelephone stations on board ships (ship stations).*

FORM OF LICENCE.

According to the Law of 24th July, 1914, and the Royal Decree of the 30th August,

1913, permission is hereby given to.....

to erect and work on board the ship.....
a Radiotelegraph Station (Radiotelephone Station) on accordance with the Table of Particulars on the last page of this form. The permission is valid from.....to.....

..... and is given on the following conditions.

1. The station shall belong to the..... class of stations as specified in the International Radiotelegraph Convention Service Regulations, Art. XIII b, and will thus have..... service.

2. The installation shall be effected in every respect in accordance with the installation plan approved by the Telegraph Department, and must not be departed from without the agreement of the said department. Ships belonging to the 1st and 2nd classes must be provided with emergency Radiotelegraph installations, as laid down in the existing Radiotelegraphic Service Regulations.

3. The holder of the licence shall, as far as the erection and working of the station is concerned, be under the obligation in every respect to adhere to existing international agreements with annexed regulations concerning Radiotelegraphy and Telephony when such international agreements have been adhered to by Norway, and further he shall abide by such regulations as may be issued by the Department for Public Works or by the Telegraph Department.

4. The Telegraph Department shall have the right, in the interests of the service and (after conferring with the Naval Department) to require any alterations to be made in the wavelengths employed as given in the above-mentioned Table of Particulars within the limits laid down in the regulations either as a temporary or permanent measure in the working of the station.

5. The holder of the licence shall recognise the importance of keeping the station in the best possible condition in order to ensure good working.

6. The station shall be under the obligation to forward telegrams to and from persons on board, with due regard to existing general rules for such work. Further, the station shall be obliged to communicate with other ship or coast stations without regard to the system of apparatus employed at those stations.

7. The answering of signals from ships in distress and the correspondence caused thereby shall have priority over all other correspondence.

8. During the ship's stay in a Norwegian Port the station must not be used for communication either with Norwegian or with Foreign coast stations. Neither shall the station, while the ship is in a Norwegian port, be used for communication with other ship stations without special permission, or unless such communication is effected with a view to prevent accidents. Special permission is granted by the Telegraph Department after conferring with the Naval Department.

9. The call signal of the station is.....
10. The tax due to the ship station is.....
.....(ore) {..... centimes) per word with a minimum of.....(ore) {..... centimes) per message.

11. The service on board must be performed by one telegraphist, or, for ship stations of class I, by two or more telegraphists holding a certificate issued by the Telegraph Department.

This certificate states that the telegraphist concerned possesses the knowledge and abilities as prescribed in the existing International Regulations.

The granting of such certificate depends upon the passing of an examination arranged by the Telegraph Department. Petty Officers and Seamen belonging to the Navy's staff of mechanics, and who are specially trained as Radiotelegraphists for the Navy, are entitled to such certificate when they can prove to the Telegraph Department that they have the necessary knowledge of the handling of telegrams and when they procure from the authority concerned in the Navy, a testimonial to the effect that they satisfy the International Regulations as far as their knowledge of the instruments, ability, etc., is concerned. Without the permission of the Telegraph Department other than Norwegian subjects must not be employed for the service on board.

The holder of the licence will take the best possible care that the contents of messages do not come to the knowledge of unauthorised persons.

The telegraphist will make the usual promise of secrecy.

12. The holder of the licence is responsible for the charges that are due for the transmission of the messages sent from the ship station, including the charge for the coast station.

The Telegraph Administration, on its side, pays to the holder of the licence the charges that are due to the ship station for the messages addressed to the ship. "Journals" (abstract) should be kept in respect of the correspondence (traffic). These "Journals," together with the originals of the transmitted messages and such other documents as may be required, are to be sent to the Telegraph Department, as far as possible, at the end of each month.

The mutual settlement of the charges will take place quarterly or monthly, as may be arranged between the Telegraph Department and the holder of the licence. However, with the agreement of the Telegraph Department the holder of the licence may make other arrangements for the accounting of stations on ships that are exclusively engaged in foreign waters. Such arrangements may be made with the Administrations to which the coast stations that the ships usually make use of belong. Similarly, the Telegraph Department may make arrangements other than those mentioned above with Foreign Administrations.

13. The station is subject to such supervision as may be decided by the Department for Public Works, and one or more of the Officials appointed by the Department for Public

Works or by the Telegraph Department should be given opportunity to inspect the station.

For the supervision of the station the holder of the licence has to pay a certain fee that will be decided by the Department.

14. When State or other public reasons so demand it, the Department for Public Works or the Naval Department may partly or entirely prohibit the transmission of any kind of traffic correspondence at the station without admitting any claim for compensation. Likewise, in the interests of the service, the Telegraph or Naval Department can prohibit with the same effect all correspondence from the station, either at certain places or at certain times of the day.

15. The Norwegian State has the right to take over the station with six months' notice against compensation, the amount of which will be fixed after valuation, should it not be possible to arrive at an amicable adjustment.

The valuation will be made by a Committee of three members, whereof one member is nominated by the owner, one by the Telegraph Department and one by the Department for Public Works.

The member nominated by the Department for Public Works will be the Chairman of the Committee.

The questions put before the Committee will be decided solely by majority of votes.

In case the owner has not, within thirty days after the reception of the invitation, made any such nomination as mentioned above, or in case the member nominated by him fails to attend, the valuation will then with obligatory effect be decided by the other nominees.

In case of equal voting the vote of the Chairman shall decide the matter.

In the valuation regard shall only be paid to the technical value of the station at the moment of valuation, the income, etc., derived from the station not being taken into account.

The valuation shall take place within a time-limit fixed by the Telegraph Department and will be at the public expense.

16. The licence shall become null and void in case:—

(a) Use is not made of it within a year of its issue.

(b) Breach is made of any of its regulations.

(c) The ship ceases to fly the Norwegian flag.

17. Disputes as to the intent and meaning of this licence shall, with obligatory effect, be decided by the King.

The Telegraph Department,

Christiana.....19

SCHEDULE.

System	Type of Installation.	Normal range (by day).	Wave-lengths (the normal wave to be underlined).	Description of Power Supply.	Description of Transmitting and Receiving Instruments. (Detailed sketch of connections attached.)	Type of Aerial (Sketch with measurements attached).	Description of Emergency Gear for ship stations of 1st and 2nd classes. (Detailed sketch of connections attached.)	Remarks

CERTIFICATE.

E It is hereby testified, that..... has in a satisfactory manner stood the test or radiotelegraphists, ordered by the Telegraph Administration, comprising:—

(a) Management of apparatus, and knowledge of their action.

(b) Transmitting and receiving by the ear with the speed ordered for a certificate of..... Class.

(c) Regulations.

With reference to above, and as..... has made the promise of secrecy fixed for telegraph officials, there is hereby given to..... a certificate of..... Class, as radiotelegraphist on board ships.

The Telegraph Administration, Kristiania, the.....

NOTICE TO MARINERS.

F The State Telegraph Department issued in December, 1908, the following "Notice to Mariners" applying to wireless telegraph equipments on board ships in Norwegian territorial waters:—

1. Wireless telegraph or wireless telephone stations on board foreign vessels must not be operated, except by special permission, within Norwegian territorial waters. Requests for such permission must be sent to the Telegraph Department, which will communicate its decision after conference with the Marine Department.

2. Permission to operate the stations on board foreign vessels within Norwegian territorial boundaries may be restricted to certain fixed places, or to certain fixed periods of the 24 hours. Correspondence by means of the wireless apparatus shall be at once suspended whenever it shall be so desired by the Telegraph Department, the Marine Department, or by any one of the coast stations under their authority.

3. During the stay of a vessel in a Norwegian harbour, within a distance of 5 kilometres (2½ miles) from the nearest telegraph station, the station on board a foreign vessel must not be employed for telegraphing either with Norwegian or foreign coast stations. Without a special permission, the station during a vessel's stay in a Norwegian harbour must not be employed for communicating with other ship stations except for the purpose of preventing accidents.

4. The regulations above-mentioned do

not, however, apply to stations on board vessels of war belonging to foreign powers, which carry on mutual correspondence. Such stations are, however, bound to submit themselves to the regulations contained in the second clause of Section 2.

5. Whenever the station on board a foreign vessel is employed during her stay in Norwegian territorial waters, this shall be done subject to the regulations contained in the International Telegraph Convention, with the rules pertaining thereto.

PROHIBITION AGAINST THE USE OF WIRELESS TELEGRAPH IN NORWEGIAN TERRITORIAL WATERS.

G Pursuant to Act of July 24th, 1914, the following is ordained:—

1. All use of wireless telegraph from ships of belligerent powers is forbidden in Norwegian ports, the whole area of the naval ports included. Such ships as mentioned are therefore during their stay in such ports to have their aerials (antenna) lowered and, if required by the authorities, to have their wireless stations sealed.

2. In Norwegian territorial waters the use of wireless telegraph from ships of belligerent powers is likewise generally forbidden. Merchant vessels of belligerent powers shall therefore, while in Norwegian territorial waters, have their aerials (antenna) lowered, and, if required by the authorities, have their wireless stations sealed.

3. In Norwegian ports, the whole area of the naval ports included, all use of wireless telegraph from Norwegian merchant vessels and foreign merchant vessels of non-belligerent powers is forbidden, unless it be done in order to prevent disasters. The authorities may, if it be considered desirable, also subject such ships to further restrictions, require their aerials (antenna) lowered and their wireless stations sealed.

Order to control that these provisions are observed by all concerned is issued to Norwegian warships, naval and military authorities, pilotage, customs, harbour and police authorities, as well as by pilots serving on board of such vessels as above mentioned.

Infringements are liable to punishment.

K. FR. DAWES,

Admiral Commander-in-Chief,

K. OSTBYE.

Kristiania, June 2nd, 1917.

NYASALAND PROTECTORATE

(See map on p. 377.)

THIS Colony was constituted on May 14th, 1891, as the "British Central Africa" Protectorate, and so remained until 1907, when it assumed its present appellation. Its area covers 39,573 square miles, the trade centre being Port Herald, Chiromo (Lower-Shiré), Kota-Kota, Karonga, and Forts Johnston (Lake Nyasa). Communication is maintained by river steamer with the port of Chinde on the Indian Ocean littoral.

It is administered (under the Colonial Office) by the Governor and Commander-in-Chief, assisted by an Executive and an Administrative Council

ADMINISTRATION.

Wireless Telegraphy is not at present in operation, although provision

has been made in the Statute Book for its regulation if ever it be introduced, as follows :—

WIRELESS ORDINANCE, 1908.

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1908."

2. No person shall establish or use any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening this section shall be liable on conviction to a fine not exceeding £100 or to imprisonment with or without hard labour for a term not exceeding twelve months with or without the option of a fine, and in addition any apparatus or installations in respect of which an offence under this section is

omitted may be forfeited and sold or disposed of as the Governor may direct.

3. The Governor in Council may from time to time make, and when made shall publish in the *Gazette*, rules prescribing the terms and conditions upon which licences to establish or use apparatus or installations for the purpose of operating wireless telegraphs may be granted, and may impose a penalty on conviction for breach of any rules so made of a fine not exceeding £50 or imprisonment with or without hard labour for a term not exceeding six months with or without the option of a fine, and such Rules may further provide for forfeiture and sale or disposal as the Governor may direct of any such apparatus or installations as aforesaid.

PACIFIC ISLANDS

BEFORE the war, the islands in the Pacific were divided with regard to European supervision between Germany, France, and Great Britain. The former has now disappeared completely from the Pacific. It is not yet possible to include particulars concerning the French spheres of influence, and we therefore for the present confine ourselves to the British.

The High Commissioner of the Western Pacific (assisted by deputies) exercises jurisdiction in accordance with an Order in Council of 1893, for the purpose of carrying out the provisions of the Pacific Islanders' Protection Acts of 1872 and 1875, and to settle disputes between British subjects living in these islands. The authority of the High Commissioner extends over all the Western Pacific not within the limits of Fiji, New Zealand, Queensland, or New South Wales, or the jurisdiction of any civilised power, and includes the Southern Solomon Islands and the various small groups in Melanesia.

The New Hebrides are ruled under the joint administration of British and French officials, in accordance with the Anglo-French Convention of 1906.

The principal groups consist of the British Solomon Islands, the Gilbert and Ellice Islands, the Tonga or Friendly Islands, the Phoenix Islands, Pitcairn Islands, and the New Hebrides.

Of these only Fanning Island (which under an Order in Council of January 27th, 1916, was included in the Gilbert and Ellice Colony) is connected by cable with the rest of the world.

With regard to the other islands, the only telegraphic communication is by means of wireless, and we are able to print below the Wireless Regulations in force in the Gilbert and Ellice Colony, wherein the centre of administration (at Ocean Island) is able to exchange official and public correspondence with Nauru, Tulagi and Apia. We also print regulations promulgated by the joint administration of the New Hebrides.

GILBERT AND ELLICE COLONY

THIS group comprises 31 islands, with a number of islets depending upon them, and lies between latitude 4° N. and 10° S.; its longitude being 169° E. to 158° W. The total area approximates to 200 square miles. Out of a population of about 32,000, four hundred are Europeans and three hundred and fifty Asiatics, the remainder being Polynesians and Micronesians.

The Government Headquarters are located at Paanopa, Ocean Island, which is also the scene of important operations by the Pacific Phosphate Company.

CONTROL AND ORGANISATION.

Radiotelegraphy is a Government monopoly, though licences may be granted for private erection and working. There are at present three Government land stations for public service. The first station, a 5-kw. Marconi set, was installed at Ocean Island at the end of 1915. The others are at Fanning and Washington Islands respectively. There are no existing or projected stations designed for aviation or meteorological purposes and no time or weather programme is in force at any of the existing stations.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. C. R. Keyte	Officer in Charge	Ocean Island
Mr. G. L. G. Tilford	Acting Officer in Charge	Ocean Island

ADMINISTRATION.

The following are the rules and regulations at present in force :—

A—King's Regulation No. IX of 1912.

B—Rules under the provisions thereof.

KING'S REGULATION No. IX OF 1912.

TO GOVERN THE USE OF WIRELESS TELEGRAPHY IN THE WESTERN PACIFIC.

A 1. This Regulation may be cited as "The Wireless Telegraphy Regulation, 1912."

2. The Wireless Telegraphy Regulation, 1907, is hereby repealed.

3. (1) It shall not be lawful for any person to establish, instal or use any apparatus for the purpose of electrical communication by means of wireless telegraphy in any protectorates, islands, or places within the jurisdiction of the High Commissioner for the Western Pacific specified in the schedule hereto without a licence to do so first obtained from the said High Commissioner.

(2) A licence under this section shall be subject to such terms and conditions as may be prescribed by any rules made under this regulation and to such other terms and conditions as the High Commissioner may from time to time prescribe.

4. The High Commissioner may make rules from time to time to carry out the provisions of this regulation and in particular to regulate the use of apparatus for wireless telegraphy on board merchant ships, whether British or foreign vessels, while in the territorial waters of the protectorates or islands or places aforesaid.

5. Any person who contravenes the provisions of this Regulation or of any rules made hereunder, or fails to observe and perform the terms and conditions of a licence granted by the High Commissioner hereunder or prescribed by any rules aforesaid, shall be liable to a penalty not exceeding one hundred pounds and to the forfeiture of any apparatus established, installed or used for the purpose aforementioned.

6. This Regulation shall not apply to the islands of the Pacific Ocean known as the New Hebrides, including the Banks Islands and Torres Islands.

SCHEDULE.

The British Solomon Islands Protectorate, The Gilbert and Ellice Islands Protectorate, The Union (Tokelau) Islands, The Phoenix

Islands, Fanning Island, Washington Island, Christmas Island and all other islands in the Western Pacific not being within the jurisdiction of the Commonwealth of Australia or any of the states thereof or of the Dominion of New Zealand or of any civilised Power.

B RULES TO REGULATE THE USE OF WIRELESS TELEGRAPH APPARATUS ON MERCHANT SHIPS IN THE WESTERN PACIFIC, MADE BY THE HIGH COMMISSIONER UNDER THE PROVISIONS OF THE WIRELESS TELEGRAPHY REGULATION, 1912.

1. These rules may be cited as the Wireless Telegraphy Rules, 1917.

2. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the protectorates, islands and places specified in the Schedule to the Wireless Telegraphy Regulation, 1912, shall be worked in such a way as not to interfere with—

(a) Naval signalling; and

(b) The working of any wireless telegraph station, lawfully established, installed or worked in those protectorates, islands or places or the territorial waters thereof;

and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

3. (a) The apparatus for wireless telegraphy on board a merchant ship shall not be worked whilst such ship is within a harbour in any colony, protectorate or island specified in the Schedule to the Wireless Telegraphy Regulation, 1912.

(b) For the proper enforcement of the above every ship of British register in any such harbour shall completely disconnect its aerial wires from its radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

(c) Every ship of foreign register in any such harbour shall, subject to the provisions of the

following subsection (d) take down its aerial wires completely and disconnect the same from its radiotelegraph apparatus.

(d) A ship of foreign register remaining in any such harbour for less than twelve hours, may, at the discretion of the Resident Commissioner or other Government officer in charge of the colony, protectorate or island to which such harbour belongs, be permitted to leave its aërials up, provided the same are disconnected in accordance with the provisions of subsection (b) of this rule.

4. If at any time, in the opinion of the High Commissioner, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on

board merchant ships while in the territorial waters aforesaid shall be subject to such further rules as may be made by the High Commissioner from time to time, and those rules may prohibit or regulate that use in all cases or in such cases as may be deemed desirable.

5. It shall be the duty of the master of a ship to see that the requirements of these rules are carried out.

6. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. The rules made on December 16th, 1912, are hereby repealed.

Dated this twenty-ninth day of August, 1917.

NEW HEBRIDES

THE New Hebrides consist of four groups of islands, the Banks, Torres, Central, and Southern, lying between 12° and 20° south latitude and 165° and 170° east longitude. The four groups, which have an estimated area of 5,500 square miles, comprise some fifty to sixty islands, large and small, of which the largest are Santo (Espirito Santo), Malekula, and Efate. The islands are administered by a Condominium established under a Convention between Great Britain and France, signed on October 20th, 1906, each country being represented by a Resident Commissioner. The seat of Government is at Vila, in the island of Efate. The laws of the two nations apply to their respective nationals in the group, as also such joint regulations as may be passed by the Resident Commissioners, or the High Commissioners for Great Britain and France under the authority of the Convention referred to. Natives are subject to regulations similarly enacted.

CONTROL AND ORGANISATION.

An agreement was arrived at in 1913 between the British and French Governments to establish a wireless telegraph station in the New Hebrides at the joint expense of the two Governments. In March, 1915, a contract was entered into with the Société Française Radio-électrique for the erection of such a station at Vila on the island of Efate. In October, 1915, the engineer and operator, together with the material, arrived at Vila, and on September 1st, 1916, the installation was completed, and the station opened to the public.

Wireless telegraphy in the New Hebrides is practically a State monopoly. No provision is made for licences for private installations, which are prohibited, except with the permission of the administration. The Resident Commissioners are responsible for the control of radiotelegraphic activity in the islands. The only station at present is the land station of Vila, which is directly controlled by Government and is open for public service to ships.

There are no firms or companies engaged in the manufacture of wireless apparatus, and no wireless societies or clubs.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Mr. M. King	H.B.M. Resident Commissioner	Vila
Mr. Marcel Courtois ..	Officer in Charge Wireless Station and Sole Operator..	Vila

ADMINISTRATION.

Two joint regulations affecting wireless telegraphy have been issued by the Condominium administration, the first dated January 7th, 1909, No. 1,

"The Wireless Telegraph Regulation, 1909," the other the "Wireless Telegraph (Ships) Regulation, No. 3, of 1916."

The texts of these appear below:—

A—Regulation dated 1909.

B—Wireless Telegraph (Ships) Regulation, 1916.

**A JOINT REGULATION TO REGULATE THE
INSTALLATION OF WIRELESS TELEGRAPHY
IN THE NEW HEBRIDES.**

A 1. From the date of the passing of this regulation it shall be unlawful for any person to use or establish in any of the islands of the New Hebrides, including the Banks and Torres Islands, any apparatus or installation for the purpose of electrical communication by wireless telegraphy without a licence first obtained from the Resident Commissioners conjointly such licence to be granted on such terms and conditions as the Resident Commissioners aforesaid may from time to time determine.

2. Any person offending against the provisions of the preceding section or failing to comply with the terms and conditions of a licence when granted by the Resident Commissioners under the provisions of this regulation shall be liable to a penalty not exceeding twenty pounds and to forfeit any apparatus used or established for the purpose aforementioned.

3. Offences against this regulation shall be justiciable by the Joint Court contemplated by the tenth Article of the Anglo-French Convention of the twentieth day of October, one thousand nine hundred and six, and pending the establishment of such court by the court of the nation to which or to whose legal system the accused may belong.

4. This regulation may be cited as "The Wireless Telegraphy Regulation, 1909."

Published and exhibited at the Public Offices of the Resident Commissioners for His Britannic Majesty and for the French Republic this seventh day of January in the year one thousand nine hundred and nine.

**A JOINT REGULATION TO CONTROL THE USE
OF WIRELESS TELEGRAPH APPARATUS ON
MERCHANT VESSELS IN THE NEW
HEBRIDES.**

B 1. From the date of the passing of this regulation all apparatus for wireless telegraphy on board merchant ships in the territorial waters of the New Hebrides shall be worked in such a way as not to interfere with:

(a) Naval signalling;

(b) The working of any wireless telegraph station lawfully established, installed or worked in the New Hebrides or the territorial waters thereof; and

(c) The transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraph on board a merchant ship shall be worked or used while the ship is in any of the harbours of the New Hebrides except with the joint special or general permission of the Resident Commissioners.

3. The Resident Commissioners shall have power to issue such further rules as to them may seem expedient for the control of wireless telegraphy on merchant vessels and for the censorship of messages transmitted from such vessels while in the territorial waters of the Group.

4. Any infraction of this regulation shall be punishable by the Joint Court with a money penalty of from one to twenty pounds and imprisonment for one day to one month or with one or other of these penalties.

5. This regulation may be cited as the "Wireless Telegraph (Ships) Regulation, 1916."

Published and exhibited in the Public Offices of the Resident Commissioners for Great Britain and the French Republic, at Vila, in the New Hebrides, this 30th day of October, 1916.

TONGA ISLANDS

O THERWISE known as the Friendly Islands, this group remained, until 1899, a neutral territory in accordance with the Declaration of Berlin, April 6th, 1886. Under the terms of the Anglo-German Agreement (November 14th, 1899), subsequently accepted by the United States, the Tonga Islands fell practically under the protectorate of Great Britain, which was proclaimed on May 10th, 1900. The present King is George Tubou II, born June 18th, 1874. The Legislative Assembly meets annually. It is composed of seven nobles, elected by their peers, seven elected representatives of the people and the seven Ministers of the Crown. Elections are held triennially.

Lack of means of rapid communication with the outside world has severely handicapped traders, growers and other residents of the Tongan group of islands.

Their long term of isolation is now ended, for direct wireless communica-

tion has been established between Nukualofa and Suva (Fiji Islands) and Apia (Samoan Islands).

The entire apparatus, which includes the latest magnifying valve receivers, power plant, storage batteries and specially designed masts, was manufactured by Amalgamated Wireless (Australasia), Ltd., at that company's works in Sydney, and erected by Australian engineers.

CONTROL.

A department of Telegraphs and Telephones was inaugurated at the time of the erection of the wireless station, under whose jurisdiction fall all matters concerning radiotelegraphy and radiotelephony.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. J. R. Land (<i>Not yet appointed</i>)	Officer in Charge of Telegraphs and Telephones .. Assistant Wireless Officer	Nukualofa Nukualofa

The station of Nukualofa is owned and controlled by the Tongan Government and handles commercial traffic.

ORGANISATION.

Nukualofa Radio (the only station yet erected in the Friendly Islands) was opened for commercial traffic on December 30th, 1919. The station works with Suva (Fiji), Apia (Samoa) and ships, as under, local time :—

9.50 a.m. clears with Suva on 600 metres ; 11.50 a.m. clears with Apia, using a transmitting wavelength of 1,200 metres (Apia transmits on 2,000 metres) ; 2.50 p.m. second clearance with Apia as above ; 3.50 p.m. second clearance with Suva on 600 metres ; 8 p.m. to 10 p.m., on watch, during which time clearances are again effected with Suva and Apia (both on 600 metres) and also with any ships within range and having traffic.

Telegrams are delivered between the hours of 9 a.m. and 4 p.m. No portorage charge is imposed on delivered telegrams. These are delivered within a one-mile radius of the wireless station. Telegrams for persons residing outside the mile radius are either posted to the addressee or delivered to an authorised agent residing within the mile radius.

ADMINISTRATION.

As regards the European population, Tonga comes under King's Regulation No. IX of 1912. (*See* Gilbert and Ellice Colony under "Pacific Islands.") The use of wireless stations on merchant ships is controlled by the "Wireless Telegraphy Rules, 1917," made under the above-mentioned King's Regulation. An Ordinance is in effect regulating the use of wireless by Tongan natives. (*See* A below.)

A—An Ordinance to govern the use of wireless telegraphy in the Kingdom of Tonga. (No. 5 of 1918.)

AN ORDINANCE

TO GOVERN THE USE OF WIRELESS TELEGRAPHY IN THE KINGDOM OF TONGA. (No. 5 of 1918.)

A Be it enacted by the King by the advice and with the consent of the Privy Council as follows :—

1. The short title of this Ordinance shall be The Wireless Telegraphy Ordinance, 1918.

2. It shall not be lawful for any Tongan to establish maintain or use in the Kingdom of Tonga any apparatus or instrument for the purpose of electrical communication by means

of wireless telegraphy without having previously obtained from the Privy Council a licence in that behalf to be granted on such terms and conditions as may be prescribed by any rules made under this Ordinance and on such other terms and conditions as the Privy Council may from time to time think fit to prescribe.

3. It shall be lawful for His Majesty the King in Council from time to time to make rules :—

(a) Prescribing the manner in which licences under this Ordinance are to be applied for and granted and the fees payable on the grant of such licence.

(b) Generally for the purpose of carrying this Ordinance into effect.

4. Any person who contravenes the provisions of this Ordinance or of any rules made hereunder or fails to observe or perform the terms or conditions of a licence granted hereunder or prescribed by any rules aforesaid shall be liable on conviction to a fine not exceeding fifty pounds or in default of payment to imprisonment for any term not exceeding six months and the apparatus or instrument in respect of which

such conviction was obtained may by order of the magistrate before whom such conviction was obtained be forfeited.

5. All proceedings under this Ordinance may be taken before a Police Magistrate and the mode of procedure shall be according to the law in force for the time being in respect of other offences punishable on conviction before a Police Magistrate.

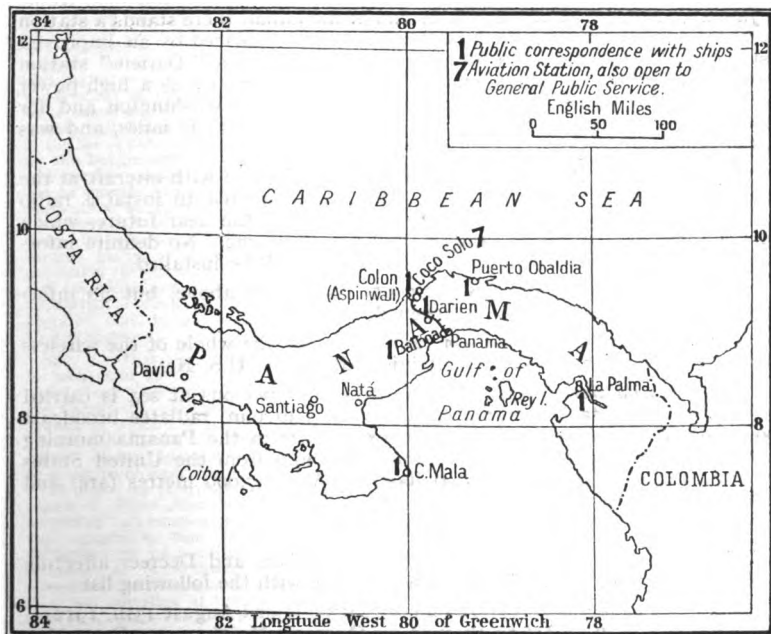
March 5th, 1918.

PANAMA (CANAL ZONE)

THE idea of a Canal through the Isthmus of Panama originated with a Spanish engineer in 1530. Monsieur de Lesseps laboured on its construction from 1882 to 1894, when the United States Government took over the undertaking. This action of the U.S.A. followed closely on the establishment of a separate Republic of Panama (a secession from the U.S. of Colombia), which took place on November 23rd, 1903. The American Canal was opened for traffic on August 15th, 1914.

The American-controlled zone consists of a strip of land 10 miles in width, extending across the Isthmus a distance of 50 miles. The rights of sovereignty are vested in the U.S.A. under a Treaty signed on February 26th, 1904.

The zone is ruled by a Governor, who reports through the Secretary of War to the President and conducts the government according to the authority invested in him by Acts of Congress and Executive orders. In periods of crisis or times of war the supreme command is vested in the Commanding Officer of the Troops, designated as the Panama Canal Department of the U.S.A. Army.



CONTROL.

Radiotelegraphy in the zone is administered by the Navy Department of the United States. All wireless stations on the Isthmus are under control of the Commandant, 15th Naval District, Balboa Heights, Canal Zone, and under the immediate supervision of the Communication Superintendent, 15th Naval District.

Under agreement between the Republic of Panama and the United States of America Radiotelegraphic Communication within the Republic, as well as in the Canal Zone, remains under the control of the U.S.A. This arrangement rests on Decree No. 130 of August 29th, 1914, signed by the President of the Panama Republic.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Capt. L. R. Sargent, U.S.N.	Marine Superintendent Panama Canal and Commandant 15th U.S. Naval District	Balboa Heights
Lt.-Com. F. L. Riefkohl ..	Communication Superintendent 15th U.S. Naval District	Balboa Radio Station Fort Amador

ORGANISATION.

The first radio station erected was situated in the Republic of Panama within the municipal limits of the City of Colon, in 1906, and the reservation there established is still the site of a successor to this pioneer station.

The small station established at Porto Bello, Panama, in 1909, was closed on May 13th, 1914. The Colon station, established on March 1st, 1910, was re-equipped with improved apparatus, and opened to commercial traffic in January, 1913. At Balboa (Pacific end of the Canal) there stands a station opened for commercial business in June, 1913, and replaced by an improved installation on the same site in 1914. The well-known "Darien" station (located alongside the Canal, midway between the oceans) is a high-power installation, designed primarily for communication with Washington and for naval vessels at sea. It possesses a sending radius of 3,000 miles, and was placed in regular service on April 5th, 1915.

There is a Naval Radio Station for communication with aircraft at the Naval Air Station, Coco Solo, C.Z. It is contemplated to instal a radio telephone transmitter at that station some time in the near future, which will be available for use in handling commercial traffic. No definite information is available as to the time when this set will be installed.

There have been some developments not shown above, but no information concerning them has yet been disclosed.

There are no wireless clubs or radio societies, the whole of the wireless operations being controlled and administered by the U.S. Navy.

An unofficial news service for the benefit of persons at sea is carried on by the Colon station, which each day at 3.30 p.m. radiates broadcast about 200 words of news made up of extracts from the Panama morning papers, whilst Press despatches obtained by radio from the United States are re-broadcasted at 5 a.m. by Balboa (NBA) on 7,000 metres (arc) and 2,400 metres spark.

ADMINISTRATION.

We publish below the text of the various Acts and Decrees affecting radiotelegraphy in the Canal Zone in accordance with the following list :—

A—Act to regulate Radio Communication issued August 13th, 1912.

B—Section 6 of Act to Provide for Opening, Maintenance, Protection and Operation of the Panama Canal (dated August 24th, 1912).

C—Extracts from Rules and Regulations for the Operation and Navigation of the Panama Canal, dated August 15th, 1919.

D—Notice concerning Commercial Service at Naval Stations, dated September 1st, 1913.

E—Circular *re* Compulsory Wireless, dated July 23rd, 1914.

F—Circular *re* Free Radio Service, dated November 17th, 1914.

AN ACT TO REGULATE RADIO COMMUNICATION.

A Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a licence, revocable for cause, in that behalf granted by the Secretary of Commerce and Labour upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: Provided, that the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a licence shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce and Labour. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanour, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2.—That every such licence shall be in such form as the Secretary of Commerce and Labour shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the licence is granted; that every such licence shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wavelength or the

wavelengths authorised for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorise the use of any apparatus for radio communication in any other station than that specified. Every such licence shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such licence shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorise the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

SEC. 3.—That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labour. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said licence for a period to be fixed by the Secretary of Commerce and Labour not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanour, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court, for each and every such offence: Provided, that in case of emergency the Secretary of Commerce and Labour may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of June twenty-fourth, nineteen hundred and ten.

SEC. 4.—That for the purpose of preventing or minimising interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labour through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce and Labour may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labour

may grant special temporary licences to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wavelengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

1. *Normal Wavelength.*—Every station shall be required to designate a certain definite wavelength as the normal sending and receiving wavelength of the station. This wavelength shall not exceed 600 metres or it shall exceed 1,600 metres. Every coastal station open to general public service shall at all times be ready to receive messages of such wavelengths as are required by the Berlin Convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wavelengths, one of 300 metres and one of 600 metres, as required by the international convention in force: Provided, that the Secretary of Commerce and Labour may, in his discretion, change the limit of wavelength reservation made by Regulations 1 and 2 to accord with any international agreement to which the United States is a party.

2. *Other Wavelengths.*—In addition to the normal sending wavelength all stations, except as provided hereinafter in these regulations, may use other sending wavelengths: Provided, that they do not exceed 600 metres or that they do exceed 1,600 metres: Provided further, that the character of the waves emitted conforms to the requirements of Regulations 3 and 4 following.

3. *Use of a "Pure Wave."*—At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wavelengths, more or less sharply defined, as indicated by a sensitive wavemeter, the energy in no one of the lesser waves shall exceed 10 per cent. of that in the greatest.

4. *Use of a "Sharp Wave."*—At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

5. *Use of "Standard Distress Wave."*—Every station on shipboard shall be prepared to send distress calls on the normal wavelength designated by the international convention in force except on vessels of small tonnage unable to have plants insuring that wavelength.

6. *Signal of Distress.*—The distress call used shall be the international signal of distress:—
● ● ● — — — ● ● ●

7. *Use of "Broad Interfering Wave" for Distress Signals.*—When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

8. *Distance Requirement for Distress Signals.*—Every station on shipboard, wherever

practicable, shall be prepared to send distress signals of the character specified in Regulations 5 and 6 with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

9. *"Right of Way" for Distress Signals.*—All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

10. *Reduced Power for Ships near a Government Station.*—No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress or signals or radiograms relating thereto.

11. *Intercommunication.*—Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period of not less than two minutes, with the receiver tuned to receive messages of 300 metre wavelengths.

12. *Division of Time.*—At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations cannot be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wavelengths and the character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labour may, on the recommendation of the Department concerned, designate the station or stations which may be required to observe this division of time.

13. *Government Stations to Observe Division of Time.*—The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

14. *Use of Unnecessary Power.*—In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

15. *General Restrictions on Private Stations.*—No private or commercial station not engaged

in the transaction of *bona fide* commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wavelength exceeding 200 metres, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labour contained in the licence of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of \$100 or \$25, respectively provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

16. *Special Restrictions in the Vicinities of Government Stations.*—No station of the character mentioned in regulation 15 situated within five nautical miles of a naval or military station shall use a transmitting wavelength exceeding 200 metres or a transformer input exceeding one-half kilowatt.

17. *Ship Stations to Communicate with Nearest Shore Station.*—In general, the ship-board stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this cannot be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

18. *Limitations for Future Installations in Vicinities of Government Stations.*—No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations—to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of 1906 and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of 1906 and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within 100 nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental

business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

19. *Secrecy of Messages.*—No person or persons engaged in or having knowledge of the operation of any station or stations shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorised agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than \$250 or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the Court.

Penalties.—For violation of any of these regulations, subject to which a licence under sections 1 and 2 of this Act may be issued, the owners of the apparatus shall be liable to a penalty of \$100, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any of such regulations the licence may be revoked.

For violation of any of these regulations, except as provided in Regulation 19, subject to which a licence under section 3 of this Act may be issued, the operator shall be subject to a penalty of \$25, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any such regulations, the licence shall be suspended or revoked.

Sec. 5.—That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed \$500 or imprisonment for not to exceed one year, or both.

Sec. 6.—That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

Sec. 7.—That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than \$2,500 or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offence, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than \$1,000 or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offence.

SEC. 8.—That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections 4 and 7 of this Act and so much of section 5 as imposes a penalty for interference. Save as aforesaid, nothing in this act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9.—That the trial of any offence under this Act shall be in the district in which it is committed, or if the offence is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10.—That this Act shall not apply to the Philippine Islands.

SEC. 11.—That this Act shall take effect and be in force on and after four months from its passage.

Approved, August 13th, 1912.

EXTRACT FROM ACT.

(Dated August 24th, 1912.)
TO PROVIDE FOR OPENING, MAINTENANCE,
PROTECTION AND OPERATION OF THE PANAMA
CANAL.

B SEC. 6.—That the President is authorised to cause to be erected, maintained, and operated, subject to the International Convention and the Act of Congress to regulate radio communication, at suitable places along the Panama Canal and the coast adjacent to its two terminals, in connection with the operation of the said Canal, such wireless telegraphic installations as he may deem necessary for the operation, maintenance, sanitation, and protection of said Canal, and for other purposes. If it is found necessary to locate such installations upon territory of the Republic of Panama, the President is authorised to make such agreement with said Government as may be necessary, and also to provide for the acceptance and transmission by said system, of all private and commercial messages, and those of the Government of Panama, on such terms and for such tolls as the President may prescribe: *Provided*, That the messages of the Government of the United States and the departments thereof, and the management of the Panama Canal, shall always be given precedence over all other messages. The President is also authorised, in his discretion, to enter into such operating agreements or leases with any private wireless company or companies as may best insure freedom from interference with the wireless telegraphic installations established by the United States.

EXTRACT FROM RULES AND REGULATIONS.

(Dated August 15th, 1919.)

C 40. *Radio Communication.* — As soon as radio communication can be established with the Canal, vessels should report their names, nationality, length, draft, tonnage, whether or not they desire to pass through the Canal, require coal, provisions, supplies, repairs, to go alongside of a wharf, the use of tugs, probable time of arrival, length of stay in port, or any other matters of importance or interest. If this information has been previously communicated through agents or otherwise to the captain of the port,

it will not be necessary to report by radio; but the probable time of arrival should always be sent.

41. Control of radio communication is entirely in the hands of the radio shore stations. No vessel will be allowed to interfere in the slightest degree with the Canal radio stations; upon an order being received by a vessel at any time while within the waters under the control of the Canal to discontinue using radio, even if in the midst of transmission of a message, she shall immediately comply.

42. Upon a ship's arriving within the 15-mile limit, and until leaving the 15-mile limit of the Canal Zone, she shall transmit only with low power, not exceeding one-half kilowatt.

43. Messages to stations will be sent only to Colon station (NAX) when in Gatun Locks and to northward thereof, and only to Balboa station (NBA) when in Miraflores Locks and to southward thereof; between these two points ships may work to either station, preferably to the nearer one; the high-power station (Darien) at Radio will not handle commercial work and will not be called for Canal business except in case of emergency.

44. All messages between ships in the Canal Zone and ships at sea must be forwarded through the nearer shore station.

45. Messages from ships in the Caribbean Sea for ships in the Pacific waters, or *vice versa*, shall be routed through the Canal Zone shore stations.

46. All vessels fitted with radio, after leaving the terminal harbour to pass through the Canal, shall keep an operator on watch until the further terminal harbour has been reached; this applies to the time when they are anchored in Gatun Lake, while passing through the locks, or moored to the lock walls, or to any of the wharves in the Canal proper as well as when they are under way. Messages relating to the ship's movements and the Canal business shall take precedence over all commercial messages.

47. Pilots on vessels passing through the Canal shall have the right to use a vessel's radio freely for the transaction of the Canal business.

48. Under the direction of the pilots, vessels will from time to time report their progress through the Canal; accidents to machinery, propellers, steering gear, equipment, or anything else that may delay them or require assistance; any sickness or casualties that require medical attendance from Canal officials; or any other matters of importance that may arise.

49. No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on Canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on Canal business.*

50. No vessel will be allowed to communicate with any lock or signal station while in transit through the Canal, except through the pilot; all messages of any kind must be sent through him. This does not apply to vessels moored at the terminals at Cristobal or Balboa, before entering or after having passed through the Canal, which may wish to communicate through the terminal stations.

* As Amended by Executive Order of November 4th, 1914.

51. Vessels in transit through the Canal can communicate with the lock and signal station through the pilots, both by the international code and special signals; information on this subject may be obtained from the Governor of the Panama Canal.

118. In thick and foggy weather vessels will not be allowed to enter the Canal or leave locks or mooring station until the weather has cleared. Vessels in transit, when overtaken by thick or foggy weather, must immediately take every precaution and make preparation to anchor or moor at the first available place, and so remain until the weather clears. Vessels equipped with radio, when overtaken by thick or foggy weather, should immediately so report, in order that the proper fog signals may be made at the mooring stations on the approach of such vessels.

RADIO SERVICE.

Control of Radio.—The United States Government controls radio in the Republic of Panama and contiguous waters. The U.S. Naval Communication Service maintains three Naval Radio Stations in the Canal Zone; coastal stations at Colon and Balboa, and a high-powered station at Darien. In the Republic of Panama it maintains Naval Radio Stations at Cape Mala, La Palma, and Puerto Obaldia. The Cape Mala Radio Station, located at Cape Mala, R. P., at the south-west entrance to the Bay of Panama, is connected by telegraph with the Canal Zone and all telegraph offices in the Republic of Panama. The Radio Stations at La Palma and Puerto Obaldia are located in outlying sections of the Republic of Panama which have no telegraph connections, and are primarily for intercommunication between these districts and other sections of the Republic of Panama and the Canal Zone, through Balboa Radio. Control of radio communication is entirely in the hands of these stations. No vessel will be allowed to interfere in the slightest degree with the Canal radio stations; upon an order being received by a vessel at any time while within the waters under the control of the Canal to discontinue using radio, even if in the midst of transmission of a message, she shall immediately comply.

Commercial Radiograms.—All Naval Radio stations given above, except Darien, are open to commercial traffic.

Canal Business Radiograms.—With the exception of Darien, all Naval Radio Stations given above will handle Canal business addressed to the proper officials of the Panama Canal, its departments and subsidiary companies. No receiving or forwarding charge will be made by the Naval Radio Stations for this service. The first word in the address of such messages should be "GOVT" (Example: "GOVT Port Captain Cristobal.") to show that they are official messages on Canal business. The shore stations reserve the right to decide whether a message is official or commercial in character.

Stations to be Called.—Ships on the Atlantic side will communicate only with Colon (NAX). Ships on the Pacific within 50 miles of Balboa will communicate only with Balboa (NBA). Ships in the Pacific when more than 50 miles from Balboa will communicate with Cape Mala (NNT), from which station messages are relayed to the Canal Zone or Republic of Panama by telegraph. Ships in the Canal, when to the Northward of Darien will work

Colon (NAX), when to the Southward of Darien work Balboa (NBA).

Ships will communicate through nearest shore station. On arriving within range of a shore station ships should send a (TR) position report, furnishing data required by Article 28, Service Regulations Affixed to the International Radiotelegraphic Convention, London, 1912. Due to the large amount of radio work in the vicinity of the Canal, and the necessity of reducing interference to a minimum, ships should send the required position report whether they have messages to transmit or not. This is desired in order that the calling of vessels by shore stations having messages for such ships may be reduced to a minimum. Upon receiving a position report from a ship, the shore station will know that the ship is in range and will immediately deliver any messages on file for that ship. Any ship which desires to communicate with a shore station, and has not previously submitted a (TR) report to that station, will be requested to submit such report before any messages are accepted from it.

All TR reports received are given to the Port Captain concerned and to the vessel's agents (if known).

Balboa Radio (NBA) is a distant control (Receiving) station, therefore, in case of emergency, Balboa Radio may be called and communication with it established, though Balboa may at the time be transmitting.

Hours of Service.—Colon, Balboa, and Cape Mala maintain a constant watch, day and night.

La Palma and Puerto Obaldia maintain daily schedules of watches.

EXTRACT FROM SUPPLEMENT TO RULES.

(Dated September 1st, 1913.)

COMMERCIAL SERVICE AT NAVAL RADIO STATIONS.

D Beginning September 1st, 1913, the radio stations of the United States Navy at Colon and Balboa are handling special classes of commercial radiograms, heretofore prohibited, as follows:—

1. Reply paid messages (where both message and answer can be prepaid by the sender).

2. Messages calling for repetition of messages (for verification only). Charge for repeating back is one-fourth the charge for the original message.

3. Radiograms to be delivered by mail. (If received from a ship, these will be mailed from the radio station. "Ocean letters" will be mailed by the ship at the first port of call, or at any port of call designated).

4. Multiple radiograms. These are messages addressed either to several persons at same address or to same person at several addresses served by the same radio station. These messages when received from sea will be separated and sent as so many individual messages over the land wire.

5. Radiograms calling for acknowledgment of receipt. (Such acknowledgment is restricted to notification of date and hour at which the coast station delivered the radiogram to ship addressed; and may be sent by either mail or telegram).

6. Paid service notices. (Sent in order to correct address or text to cancel a message, etc.)

Both stations, Colon and Balboa, are connected by direct wire with the Panama railroad telephone system and radiograms can be filed at any local office. Attention is invited to the fact that no collect messages are handled, and no commercial messages are handled, between stations which are connected by cable or telegraph, as, for instance, to Key West or Port Lincoln.

The time of arrival of all Panama railroad boats is given to the telephone control at Colon as soon as received, and can be obtained there upon request without calling the radio station at Colon.

E EXECUTIVE ORDER. WIRELESS APPARATUS ON OCEAN- GOING VESSELS.

Published in Circular No. 601-16, dated Culebra, C.Z., July 23rd, 1914.

To Require Ocean-going Vessels to be Filled with Wireless Apparatus.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:—

SEC. 1.—From and after the first day of July, 1915, it shall be unlawful for any ocean-going steamer of the United States, or of any foreign country, carrying fifty or more persons including passengers and crew, to leave or attempt to leave any port of the Canal Zone unless such steamer shall be equipped with an efficient apparatus for radio communication in good working order in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages for a distance of at least 100 miles, night or day: *Provided*, That the provisions of this order, shall not apply to steamers plying only between the Canal Zone and ports less than 200 miles therefrom.

SEC. 2.—The master or other person being in charge of such vessel which leaves or attempts to leave any port of the Canal Zone in violation of any of the provisions of this order shall, upon conviction, be fined in a sum not to exceed Five Thousand Dollars (\$5,000), and any such fine shall be a lien upon such vessel, and the vessel may be liable therefor in the District Court of the Canal Zone, and the leaving or attempting to leave by any vessel from each and every port of the Canal Zone shall constitute a separate offence.

SEC. 3.—This order shall take effect from and after this date July 9th, 1914.

EXECUTIVE ORDER.

FREE RADIO SERVICE FOR CANAL BUSINESS.
Published in Circular No. 601-33, dated Balboa Heights, C.Z., November, 17th, 1914.

Amending Paragraph 49 of the "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under its Jurisdiction."

F By virtue of the authority vested in me under the Panama Canal Act, paragraph 49 of the "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction," promulgated by Executive Order No. 1990, dated July 9th, 1914, is hereby amended to read as follows:—

49.—No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on Canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on Canal business.

PANAMA (REPUBLIC OF)

(See paragraph in italics, page 362.)

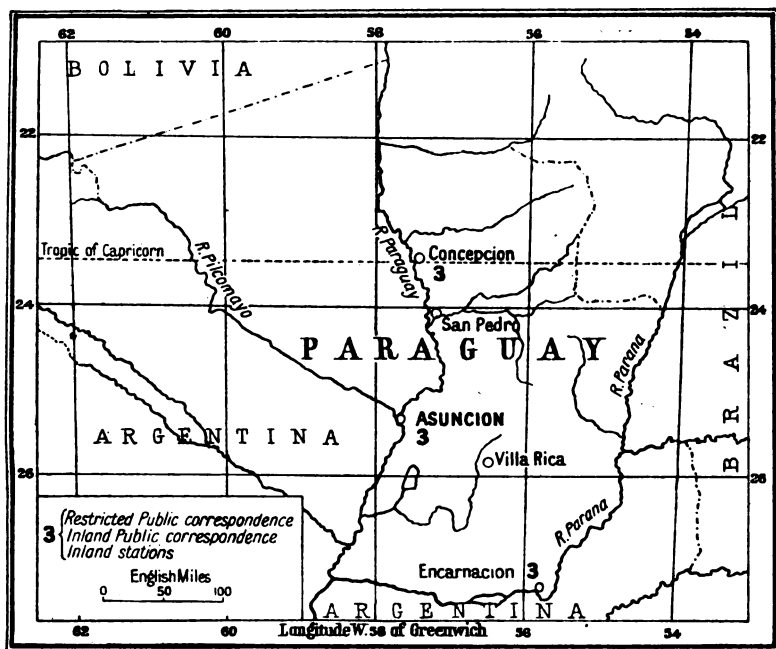
PARAGUAY

THE inland republic of South America known as Paraguay is divided into two distinct portions by the river bearing the same name. The first Spanish Colony was settled in 1535, and the country remained under Spanish rule until 1811. After a number of vicissitudes, the present constitution was proclaimed on the 25th November, 1870. The legislative authority is vested in a Congress of two houses, the executive being entrusted to a President, assisted by five Ministers.

CONTROL.

There are three wireless stations in Paraguay at present open to the public, their control being vested in the Director of Posts and Telegraphs. These stations are situated at Asuncion, the capital of the Republic (or—more strictly—Lambaré, on the outskirts thereof), Concepcion, and Encarnacion. They are identical in capacity and possess a radius of 300 miles by day and 600 miles by night. They were erected by Siemens Schuckert in accordance with a contract made with that firm and the Paraguayan Government in 1913. The Asuncion (Lambaré) station was completed in December, 1914, that at Concepcion in March, 1915, and that at Encarnacion was taken over by the Government in February, 1916.

There are no privately owned stations. The Government has instituted a wireless telegraph school which is attached to the College of Military and Naval Cadets.



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OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. Luis A. Riart	Minister of Interior	Avenida Colombia, Asuncion
(Vacant)	Director-General of Posts and Telegraphs	Calle Yegros, Esq. Bermejo, Asuncion
Juan B. Tendil	Head of Telegraph Office	431 Calle Oliva, Asuncion
Francisco Fernandez ..	Technical Inspector	Calle 14 de Julio, Asuncion

ORGANISATION.

The Paraguayan wireless service is at present confined to the interior of the country, for the Governments of Paraguay and Argentina have not yet been able to come to a working agreement for the maintenance of a public service. An agreement, however, has been entered into by the two Governments to use wireless as an auxiliary to relieve congestion or breakdown of the line system. (*See Convention below.*)

The three Government installations are not confined to a specific Government service, but are available for the public service within the country, and occasionally, on emergency, for communication with the exterior.

The War Department have seven subsidiary, or portable, installations for use at the five military centres and on the armed patrol steamers.

ADMINISTRATION.

There are no special laws or regulations affecting the subject, but the text of the Convention referred to above will be found below.

A—Convention between Paraguay and Argentina.

CONVENTION.

A The following is the text of a Convention entered into between the Governments of Paraguay and the Argentine Republic.

Date of the Convention,
November 15th, 1918.

Plenipotentiaries—

For Paraguay: Dr. Eusebio Ayala.

For Argentina: Dr. José María Cantilo.

After an interchange of credentials, which were found in order, the following agreement was signed, the object of which is to facilitate communication between the two countries mentioned.

1. For the telegraphic interchange between Argentina and Paraguay radiotelegraphic methods will be used as an auxiliary whenever owing to the amount of traffic or breakdowns in the terrestrial lines—it may become necessary to use wireless in order to maintain an uninterrupted service.

2. Both the Argentina and the Paraguay offices will use for the exchange of messages the Posadas and Formosa stations, one at a time, or the two if necessary. The two manage-

ments will see to it that the traffic is distributed in such a way as to ensure the quickest service between the hours between 12 noon and 12 midnight, Argentine time. The wavelengths will be of the standard damped type of 600 metres.

3. Whenever it is required, and should it be impossible to carry through the exchange over the stations named in the preceding article, the service may be taken off directly between Buenos Aires and Asuncion.

4. In all matters referring to transmission rates, accounts and service regulations, the Argentine and Paraguay regulations at present in force in the telegraphic service will apply.

5. This Convention will come into effect thirty days after its ratification by the contracting parties, and either party may withdraw at any time by giving 90 days' notice previous to the date when the suspension of the service is intended to take effect.

This Convention is made out in duplicate and signed by the two plenipotentiaries whose seals have been affixed, and they have agreed that the exchange of the ratification will take place in the city of Asuncion within thirty days from this date.

PEMBA

(See ZANZIBAR.)

PERIM

(See map on p. 161.)

PERSIA

THE agreement entered into with the Shah's Government lends an added interest to this country's relations with Persia. The country



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is divided into 33 provinces, and according to the most reliable estimates covers an area of about 630,000 square miles. The population exceeds nine millions.

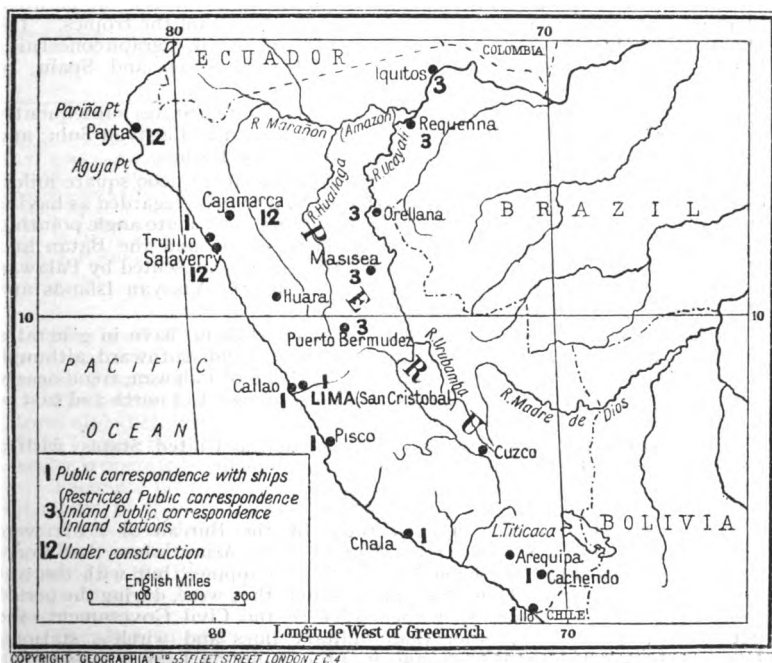
The map shows the wireless stations in operation in Persia and on the Persian Gulf, all of which are in the hands of the British Military Authorities. The largest of these is at Jask on the Gulf of Oman. The French Legation in Tehran and the Persian Cossack Division also possess a small wireless apparatus each, but they are chiefly used as receiving stations and are not believed to have the power necessary to transmit any distance.

The wireless station at Bahrein was erected by the Indo-European Telegraph Department in January, 1916, and is controlled by the Director, Indo-European Telegraph Department, Karachi, India. There is one clerk in charge and two operators, and the station is open for Government and commercial traffic.

No Laws or Regulations exist, as yet, in regard to the administration of wireless in this country.

PERU

THE Republic of Peru, formerly the most important Spanish Vice-royalty in South America, declared its independence on July 28th, 1821, but was not actually free until three years later. Its constitution was proclaimed on November 10th, 1860, and entrusts the executive power to a President, the legislation being in the hands of a Senate and House of Representatives.



Territorially it is divided into twenty departments and three provinces, the total area being estimated at 532,617 square miles. The capital city is Lima, which is closely connected with Callao, its port on the Pacific coast.

CONTROL.

The control of radiotelegraphy is directed by the Ministerio de Fomento (Minister for Progress and Public Works).

OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Señor Don Ing. Tamayo . .	Director del Servicio Radiotelegraphica del Peru . .	Lima

ADMINISTRATION.

There are fourteen radiotelegraphic stations open to public service in Peru, but no special legislation has been issued, the wireless service being subject to the same regulations as the ordinary wired service, differing therefrom only with regard to rates.

PHILIPPINE ISLANDS

THE Philippine Islands form a part of the great archipelago known as the East Indies. They lie south-east of the continent of Asia, nearly south of the Japanese Islands and north of Borneo and Celebes; between the meridians of $116^{\circ} 40'$ and $126^{\circ} 34'$ east longitude, and between the parallels of $4^{\circ} 40'$ and $21^{\circ} 10'$ north latitude, that is entirely within the tropics. The boundaries and the limits of the group are set forth in the paragraph concerning limits in the Treaty of Paris between the United States and Spain, of December 10th, 1898.

In addition to the lands thus delimited, the United States subsequently acquired from Spain the little group of islands known as Cagayan Sulu, and nine other small islands, lying off the north coast of Borneo.

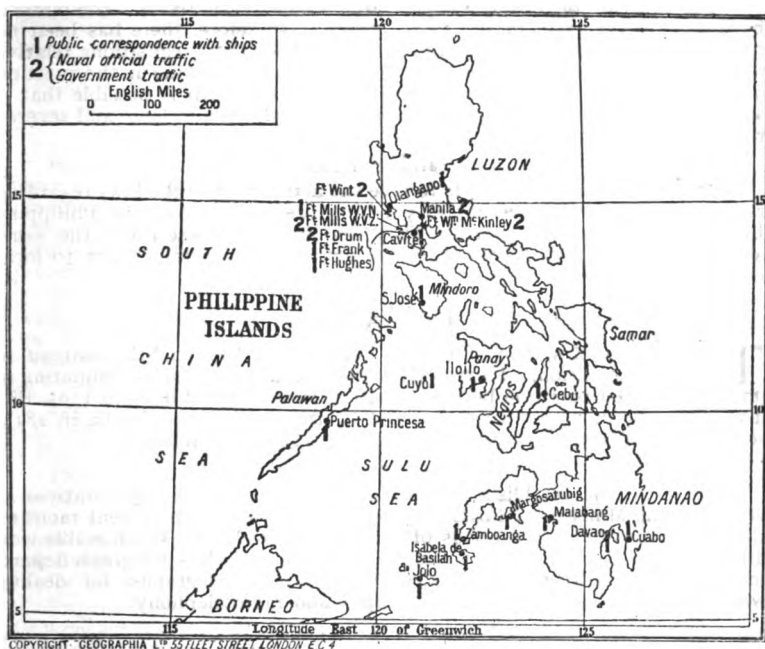
The Philippine Islands have an area of about 115,000 square miles. Considering the Philippine Archipelago by itself, it may be regarded as having the form of a triangle, open at the base and with its most acute angle pointing northward, this being represented by northern Luzon and the Batan and Babuyan Islands. The western leg of the triangle is represented by Palawan and dependent islands, and the eastern one by the Visayan Islands and Mindanao, with the Sulu sea lying between them.

These islands, and the mountain ranges upon them, have in general a trend which may be roughly described as northward and southward, although certain of them, such as that forming the backbone of Palawan, trend nearly north-east and south-west, while others trend to the west of north and east of south.

The Philippine Islands are a possession of the United States, with a representative and practically autonomous government.

CONTROL.

Several of the stations now operated by the Bureau of Posts were originally erected by the Signal Corps, United States Army, when that Corps operated the telegraph and cable lines of the Philippines, but with the rest of the telegraph system of the Philippine Islands they were, during the period from 1903 to 1907 gradually turned over to the Civil Government, the entire telegraph system, other than military lines and wireless stations, being now controlled by the Government of the Philippine Islands and forming a part of the Bureau of Posts.



OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
U.S. Army and Naval Stations		
Lieut. T. N. Alford ..	Philippine Communication Superintendent ..	Manila
Insular Government Stations		
Hon. Mr. D. Jakosalem ..	Secretary of Commerce and Communications ..	Manila
Mr. José Topacio ..	Acting Director of Posts ..	Manila
Mr. W. H. Howard ..	Radio Engineer and Technical Adviser ..	Manila
Mr. V. P. Villanueva ..	Electrical Engineer of the Bureau of Posts ..	Manila

ORGANISATION.

Nearly all of the commercial wireless traffic of the Philippines is between shore stations, which form an integral part of the telegraph system of the Insular Government.

The Continental Morse alphabet is used on the wireless, and the American Morse alphabet on land and cable lines; and the radio laws and regulations of the United States are conformed to as far as local conditions permit. The service is operated and maintained almost entirely by Filipinos.

There are no wireless societies, nor amateur or privately owned stations on record in the Philippines. There is one ship station on a Government owned vessel, and several ship stations on privately owned vessels.

There are fifteen land stations open for general public service, ten of them operated by the Bureau of Posts. These include five operated by the United States Army or Navy, but not ship stations licensed by the United States Government.

The Bureau of Posts has an extensive programme for the erection of additional wireless stations, and the erection of 18 new wireless stations in different parts of the archipelago is now under way.

The Bureau of Posts stations are designed strictly for commercial business and the relief of the cable system. Therefore, there has been no provision for radio compass stations, nor are there any regulations relative to aviation at present. The Bureau of Posts is, however, taking up the question of aerial mail service between the various islands, and it is possible that if such should become a reality there would be regulations in force and several radio compass stations erected.

ADMINISTRATION.

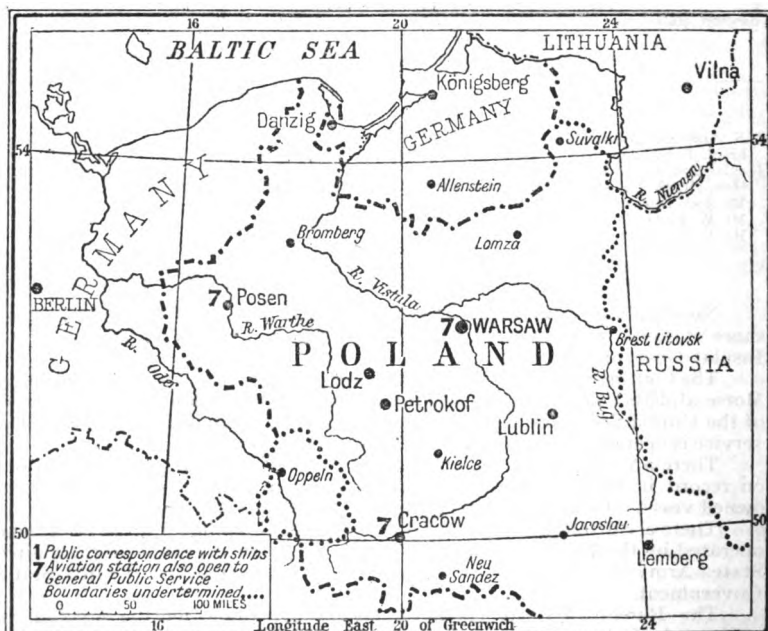
At present it is not possible to give the actual text of the laws regarding radio work, for they have not as yet been presented before the Philippine Legislative bodies for passage. They are, however, practically the same as those in force in the United States, with a few exceptions due to local conditions.

POLAND

THE historic Kingdom of Poland has recently been rightly restored to its former position. Its record has been an unhappy one, culminating in its third and last partition between Austria, Prussia and Russia in 1795, this division being subsequently rearranged by the Congress of Vienna in 1815, so that the original shares of Prussia and Austria were diminished.

CONTROL.

Normally the establishment and control of radiotelegraph stations is vested in the Ministry of Posts and Telegraphs, but at the present moment these functions lie in the hands of the Ministry of War. When stable conditions are restored it is proposed to establish a wireless telegraph department (as a branch of the Ministry of Posts and Telegraphs) for dealing with all matters relative to radiotelegraphy and radiotelephony.



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OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. Wladislaw Steslowicz ..	Minister of Posts and Telegraphs	Warsaw

ORGANISATION.

In anticipation of a great development of wireless telegraphy and telephony after the termination of the military operations, an Inter-Ministerial Commission has already been formed as in France, Italy and Russia, for the purpose of studying the problems connected with the further development of wireless telegraphy, which is regarded as one of the most important of the up-to-date means of communication over long distances.

There exist in Poland three permanent wireless stations : A 5-kw. Telef. (Telefunken) at Warsaw, a 4-kw. Poulsen at Cracow, and a 5-kw. Telef. and 4-kw. Poulsen at Posen, which, in addition to military service, are also doing service for aviation and meteorology, as well as for the Foreign Missions and the Press. There are also a number of military field stations.

The above-mentioned Inter-Ministerial Commission is collecting material on this subject, and benefits in a large measure from the experience gained by the military wireless stations.

The Central Wireless station acts mostly as a transmitting station, which is explained by its situation in the capital, which is the seat of the highest military and civil authorities, but it also receives a small quantity of press *communiqués*, whereas the Posen and Cracow wireless stations are almost exclusively engaged in receiving press *communiqués* sent to the capital by wire or by telephone.

Experts have been appointed to examine a project for the construction of a large wireless station at Warsaw of 200 to 300 kilowatt power for communication with America, whereas if the station is used for communication with European stations only, it will have a power of some tens of kilowatts.

After the results of the experiments with a receiving station fitted with a "frame antenna," a station of this type will be erected at Warsaw in the near future exclusively for receiving press news. The Polish permanent wireless stations are receiving systematically commercial and meteorological *communiqués* from all most important foreign places, whilst the Warsaw Central Station is transmitting daily a press and meteorological *communiqué*.

ADMINISTRATION.

The existing rules and regulations respecting the wireless service are of a temporary nature, and for military use only, and for obvious reasons cannot be given here.

PORTO RICO

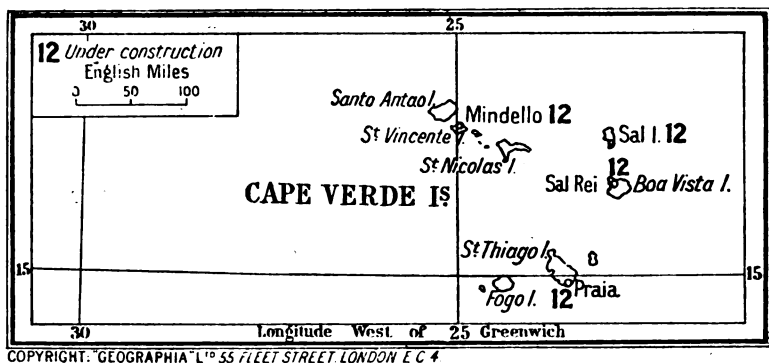
(See PUERTO RICO.)

PORTUGAL

(See map on p. 414.)

AN independent State since the twelfth century, "England's Oldest Ally" remained a monarchy till 1910. On October 5th of that year the Republic was proclaimed, and on August 20th, 1911, the present constitution was established. Affairs are administered by a President, the two Chambers reserving to themselves the legislative functions.

Portugal is a country with 5,500,000 inhabitants, and has a superficial area of 49,792 square miles (including the archipelago of the Azores and Madeira Island). She claims to be the pioneer colonising nation of the modern world.



From 1418 to 1557, the great exploration period of the Portuguese, they conquered vast territories in Africa, Asia, America and Oceania, some of which they lost in India and America, when Brazil proclaimed its independence in the year 1822. Nevertheless, the Portuguese colonies still cover an area of 1,111,572 square miles.

CONTROL.

The radiotelegraphic service in Portugal is a state monopoly. No private individual is allowed to erect or work wireless, and may not even own a simple receiver. The only exception made is that in favour of shipping companies, which are allowed to have wireless stations on board their vessels.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. João Alberto Pereira de Azevedo Neves	Minister of Commerce	Lisbon
Sr. Henrique Jacintho Ferreira de Carvalho	Postmaster-General	Lisbon
Colonel Alvaro Cesar de Mendonça	Minister of War	Lisbon
Sr. Manuel Alves de Mattos	Inspector of Telegraphic Military Service	Lisbon
Dr. Alexander de Vasconcellos e Sá	Minister of Colonies	Lisbon
Admiral Canto e Castro	Minister of the Navy	Lisbon
Admiral D. Bernardo da Costa	President of the Technical Committee of Torpedoes and Electricity	Lisbon

STATIONS IN PORTUGAL (INCLUDING AZORES).

There are no private stations and no amateur stations, for wireless is a state monopoly. The experimental stations at the School of Torpedoes and Electricity at Valle de Zebro are confined to the station of the Naval School.

Land stations open for Government traffic only ..	1
Land stations open for public correspondence..	2
And a number of ship stations open for public correspondence.	

PORTUGUESE EAST AFRICA.

Land stations open for public correspondence..	3
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CAPE VERDE ISLANDS.

Land stations under construction	4
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ORGANISATION.

Portugal's first experiments in wireless telegraphy date from 1905, and were conducted with two small Telefunken stations on a war vessel and the fortress of Cascaes, by the staff of the Posts and Telegraphs. The results, however, were not very satisfactory. Later on, Alvares, Captain of Engineers,

carried out experiments on a small scale with two Deereet stations having coherer receivers. In 1907 the first fixed station was set up at the School of Torpedoes and Electricity at Valle de Zebro (*Escola de Torpedos e Electricidade*).

With this Naval station a series of experiments were made, and it was here that the first studies in wireless originated, and the first officers and sailors of the Portuguese Marine received instruction.

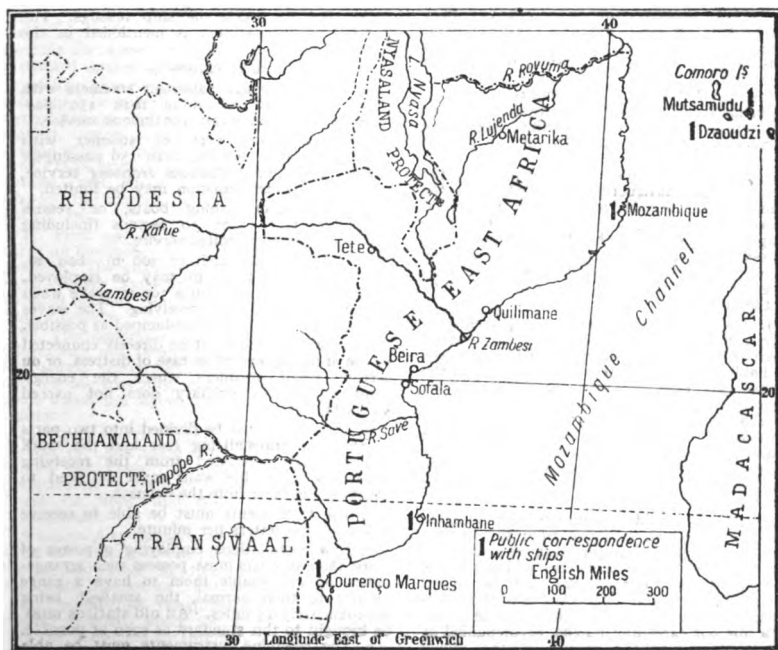
The whole work of installation, tests, and tuition was directed by the naval officer who, at the time, was the instructor at the School of Torpedoes and Electricity, and who was in charge of the Wireless Telegraphy Department.

Nowadays the School of Torpedoes and Electricity at Valle de Zebro, besides having the old apparatus for instruction, possesses a complete Marconi station with all the receivers used in the Navy, and continues to be a Naval School for officers and sailors.

Radiotelegraphy has made considerable headway, especially in the Portuguese Colonies.

Contracts have been entered into between the Colonial Office and the Marconi Company for stations at Timor (Java) and a network of stations at Angola (West Africa). A complete system of installations has been arranged for São Thomé (Gulf of Guinea) and for Mozambique (East Africa). The present Minister of Colonies, Dr. Alexandre de Vasconcellos e Sá, is responsible for the execution of this project.

The Administration of Posts and Telegraphs have also purchased a 5-kw. station for Terceira Island (Azores).



ADMINISTRATION.

The current laws and regulations reprinted below comprise :—

A—Act of July 15th, 1913.

B—Regulations.

C—Decree of April 8th, 1916.

D—Decree of March 29th, 1917.

THE ACT OF JULY 15TH, 1913.

A 1. On the expiration of a period of three months from the approval of the Regulations for the execution of the present law, no Portuguese steam vessel, with accommodation for more than fifty passengers (including crew), shall be permitted to sail from any port without having installed a wireless telegraph apparatus of the system which suits it best, in good working order, and capable of despatching and receiving radiotelegrams within a radius of action which must never be less than 100 miles.

(a) From this provision those steamers are excepted which navigate only between ports situated at distances of less than 200 miles.

(b) For steam vessels, which navigate in the Colonies where there are coastal radiotelegraph stations, and which only occasionally come to the Metropolis, the period granted for the installation of wireless telegraphy, to which the present article refers, shall be six months.

2. The wireless telegraph material of a vessel, and the respective service of transmission and reception of radiotelegrams, shall be under the charge of one or more duly qualified telegraphists.

§ The number of telegraphists, their qualifications, and that of the indispensable auxiliary staff, the organisation of their technical instruction, provisions with respect to the service of supervision, conditions of the installation of the apparatus, and the official verification of their working, shall be determined pursuant to the Regulation drawn up for the execution of the present law.

3. It is the province of the captain of the vessel to give instructions and orders for the complete carrying out of the laws and regulations in force with respect to the radiotelegraphic service, and he shall exercise the necessary supervision, carrying out and causing to be carried out any provisions which he may consider advantageous for the good working of the said service.

4. The captain shall be held responsible for any negligence in complying with the requirements of Article 1, and on conviction he shall be liable to a fine not exceeding Rs.200 and the suspension of his master's certificate for one year.

5. Negligence or failure on the part of the captain to carry out the provisions of Article 3 shall render him liable to a fine not exceeding Rs.50, which may be accompanied with imprisonment not exceeding one month after the first offence.

6. If there should be a disaster, stranding or loss of the vessel, resulting from the lack of vigilance of the telegraph staff, and the said fault was due to the negligence of the captain in failing to carry out and causing to be carried out the provisions in force relating to the radiotelegraph service, the captain shall be liable to a fine not exceeding Rs.200, accompanied or not, according to the gravity of the offence

with suspension of his certificate for a period of from one to five years.

If the serious injury, or the death, of one or more persons should result from the disaster, the penalties applicable shall be respectively those laid down in Articles 368 and 369 of the Penal Code.

7. The offences referred to in Articles 4, 5 and 6 constitute maritime crimes, and shall be judged by the Commercial Maritime Tribunal pursuant to the disciplinary Code of the Mercantile Marine.

8. All the wireless apparatus intended for Portuguese vessels shall be exempt from Customs and Municipal Duty.

9. Any legislation contrary hereto is hereby repealed.

REGULATIONS.

B The following regulations were issued on August 29th, 1913 :—

1. Ships may be equipped with any wireless telegraph apparatus which is in keeping with scientific progress.

2. The shipping or any other company may establish and work a wireless telegraph station on board ship. The station must possess a licence granted by the Government of the nationality to which the ship belongs. The "class" of the station is mentioned in the licence.

3. There are three classes :—

(a) Long voyage passenger steamers with accommodation for more than 150 passengers must maintain continuous service.

(b) The same type of steamer with accommodation for less than 150 passengers must maintain continuous receiving service, whereas the transmission may be limited.

(c) Cargo or fishing boats, or vessels carrying more than 50 persons (including crew), may have limited service.

4. and 5. Wavelength of 300 m., 600 m. and more than 1,800 m. may be employed. Small boats may work on a 300 m. wave when sending, but 600 when receiving. The waves must be as pure and as undamped as possible.

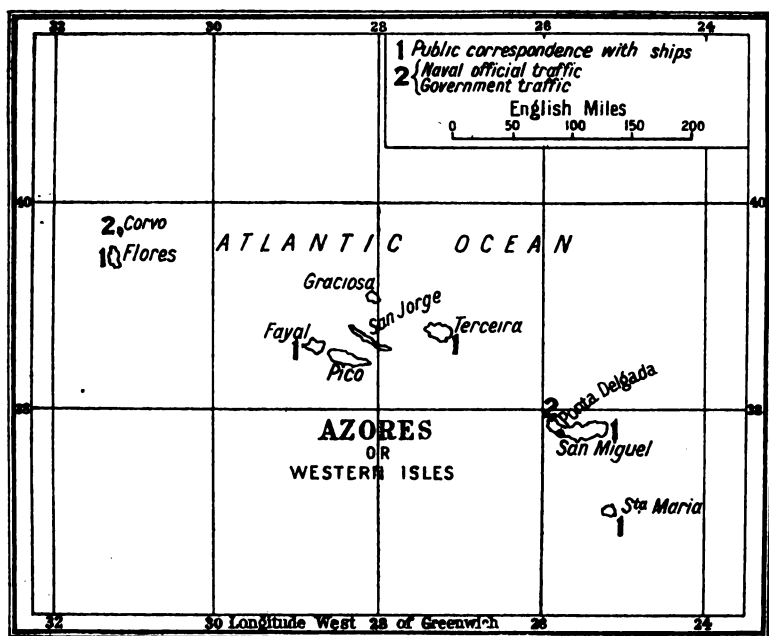
The oscillator must not be directly connected to the antennæ, except in case of distress, or on certain small steamers where the energy employed in the primary does not exceed 50 watts.

6. The cabin must be divided into two parts so that the transmitting gear and the spark gap may be separated from the receiving apparatus. Double walls must be used to isolate the interior from the exterior.

7. The instruments must be able to receive and send 100 letters per minute.

8. New installations employing a power of more than 50 watts must possess such arrangements as will enable them to have a range inferior to their normal, the smallest being approximately 15 miles. All old stations must be brought to this standard as soon as possible.

9. The receiving instruments must be able



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to tune for waves up to 600 m., being highly protected against perturbations.

10. The power measured at the terminals of the generator must not exceed 1 kw. in normal circumstances. An increase is allowed when a station desires to communicate with a land station other than the nearest, at a distance of more than 200 miles from the nearest land station, and when, in exceptional circumstances, the communication cannot be effected with 1 kw.

11. First and second-class steamers must carry an emergency set in as safe a place as is possible. The emergency set must be able to work for six hours at least at a distance of 80 miles for first class, and 50 miles for second-class steamers.

12. The apparatus must be operated by a telegraphist who possesses a certificate from the Portuguese Government, or, in urgent cases and for one trip only, from any other Government which has signed the International Convention :

13. There are two certificates :—

(a) 1st Class (same as International).

(b) 2nd Class (12 words, adjustment of apparatus, knowledge of each instrument and its work, and rules *re* handling of telegrams).

Service.—Any member of the crew able to assist the telegraphist in his work, and possessing a knowledge of the operation of the apparatus, may be an "auxiliary" operator.

14. Second-class telegraphists may be employed on board where the wireless service is only for the shipping company's requirements or on fishing vessels, or they may act as

assistants in cases where there is already one first-class operator. On first-class steamers two first-class telegraphists must be employed.

15. On second-class steamers, one first-class and one second-class telegraphist should be employed; on third-class vessels one second-class telegraphist will suffice.

Service.—As long as land stations do not exist in the Portuguese Colonies, Portuguese steamers plying there are allowed to carry one first-class telegraphist and one "auxiliary."

16. Transmitting must be performed by a first or a second-class telegraphist, except in urgent cases.

17. The certificates state that the telegraphist has taken an oath of secrecy with regard to the correspondence.

18. The captain has authority over the working of the station.

19. Portuguese operators are preferred.

20. Should none be obtainable, foreigners may be employed if they are in possession of the Portuguese Government's certificate.

In urgent cases where no certificated telegraphist is available, provisional certificates may be issued for one voyage.

21. Certificates are supplied by the Commission after the examination of the telegraphist.

22 and 23. Captains are also bound by an oath of secrecy.

32. All telegrams sent and received on board must be registered by the captain on forms supplied by the Government. The date and hour of the sending or reception of these telegrams must be indicated.

33. Only the telegraphists and the captain are allowed to enter the wireless cabin.

34. The wireless room and the bridge must be connected by either a speaking tube or a telephone, unless they are within easy distance of one another.

DECREE OF APRIL 8TH, 1916.

C This decree forbids the installation of either wireless transmitting or receiving stations, but Government can authorise the setting up of receiving stations only.

These said stations, when authorised by Government, are subject to its control, and whenever Government may judge convenient, it may withdraw the same authorisation without any indemnification.

The owners of these stations have to pay in advance the tax of Escudos \$5.50 per annum.

Anyone who sells wireless material is obliged to send to the Government a statement of the material sold, with the names of the persons who have purchased it to identify them. Those who do not fulfil this identification will pay the fine of Escudos \$20.00 to \$100.00, and all the material that he has for sale will be seized by the Government, and will belong to the Government. In case of a second offence he will be prosecuted.

The owner of any receiving station, or any person who may have made use of the same station, and who divulges contents of messages that have been received by such station incurs a penalty.

In case of a second offence he is subject to imprisonment for six months to a year, and a fine.

DECREE OF MARCH 29TH, 1917.

D In consideration of the highest interest of the State, it is undesirable in the existing circumstances that private persons should possess wireless apparatus of any kind, or make use of the same apparatus.

It has been decided that it is desirable to confine the employment of such apparatus to schools of observatories, so as to limit the risk of misuse; and availing ourselves of the authorisation granted by the Executive Power by the Laws Nos. 373 and 491 of September 2nd, 1915, and March 12th, 1916,

We decree by the proposal of the Minister of Works and Social Providence, the following:—

ART. 1.—It is expressly forbidden to private persons to possess or make use of wireless

apparatus and fittings, or to import or sell to the public the said apparatus and accessories.

ART. 2.—The owners—whatever they may claim to be its purpose—of apparatus and wireless accessories without conducting wires, will have to deliver the said articles for deposit against receipt; in Lisbon, at the warehouses of the Material of the Posts and Telegraphs; in Oporto, at the Secretary's Office of the Second Electric Circumpection; and in the other capitals of the administrative districts of the continent and adjacent islands, at the Secretary's Offices of the Electric Sections and Sub-sections, or of the Post and Telegraph Service.

The deliveries in deposit to which this article refers will have to be effected for the Continent of the Republic, in the maximum period of five days from the date when this Decree is published in the "Diário do Governo"; for the adjacent islands in the same period reckoned from the date when the same daily paper reaches there.

ART. 3.—The apparatus and wireless fittings without conducting wire that are in the Government Teaching Institutions, and at the Astronomical and Meteorological Observatories, in the first case for the purpose of demonstration, and in the second case for scientific tests, are to be under the safe keeping of the directors of the same institutions and observatories, and will be used only for those purposes and in the presence of the said directors and under their entire responsibility, in the presence of the respective teachers and observers.

ART. 4.—He who transgresses the stipulations of this Decree incurs a penalty of Escudos \$20.00 to \$100.00, which will be fixed and collected by the Administration of Posts and Telegraphs; when it is paid voluntarily, the same Administration will order all the material to be seized, which will then belong to the Government.

In case of a second offence the fine will be fixed at its maximum.

If the fine is not paid voluntarily, the transgressors will be handed over to the judiciary, in order to be judged and the penalty imposed by the correctional police.

In Lisbon and Oporto the jurisdiction will concern the tribunal of transgressions.

ART. 5.—This Decree will come into force immediately, and will be valid to the end of the European War, after which the apparatus and wireless fittings which were voluntarily delivered will be returned to their owners, against receipt as to the conditions of Article 2.

ART. 6.—All legislation to the contrary is hereby revoked.

PORTUGUESE EAST AFRICA

(See PORTUGAL.)

PORTUGUESE GUINEA.

(See map on p. 234.)

THIS Portuguese Colony, situated on the West Coast of Africa, is bounded by the limits fixed by the Convention with France held on May 12th, 1886, and is entirely enclosed on the land side by French possessions. The chief products are oilseed, ivory, wax, rubber and hides. The capital city is Bolama.

ORGANISATION.

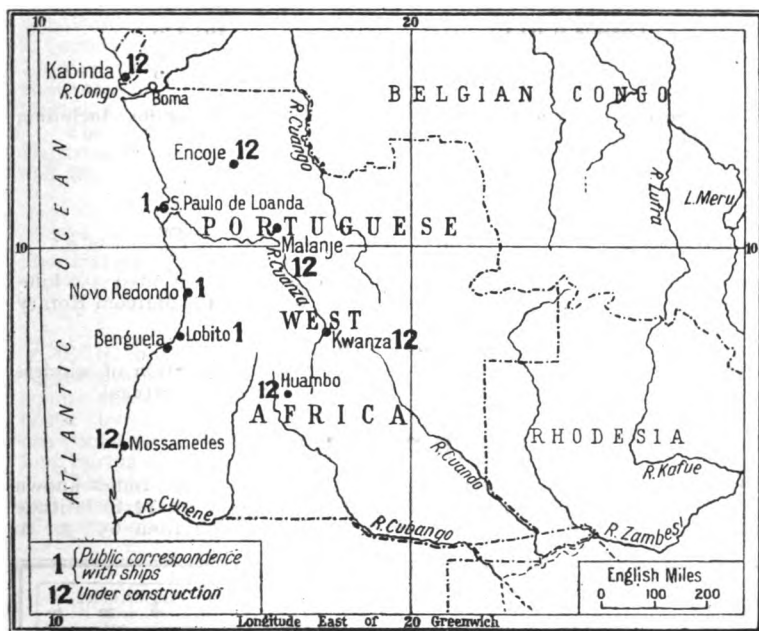
The wireless telegraph installation has not yet been inaugurated, but all the apparatus has been received and there are three stations in the course of erection.

ADMINISTRATION.

No laws or regulations exist yet for the administration of wireless telegraphy in this territory.

PORTUGUESE WEST AFRICA

This Colony, otherwise known as Angola, possesses a coast line of over 1,000 miles and is bounded on the north by the French Congo, on the east by the Belgian Congo, and on the south by British South Africa. The colony has been in the possession of the Portuguese since 1575, with the exception of a period of seven years (1641-1648), when it belonged to Holland. The territory is under the jurisdiction of a Governor-General, whose headquarters are at Loanda, the capital.



CONTROL.

Radiotelegraphy in the Colony constitutes a Government monopoly. All matters in relation thereto are in the care of a Board, under the presidency of the Governor. The Director of the Radiotelegraphic Service and the leading officials have a seat on this Board.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Commander Luiz Couceiro ..	Director of Radiotelegraphy	Loanda
Sr. Arnaldo de Paiva Carvalho ..	Assistant Engineer	Loanda

There are also a number of station superintendents, telegraphists, electricians and mechanics. Up to the present no stations other than Government stations are allowed. There are no aviation or meteorological stations.

ORGANISATION.

The decree for the creation of a wireless service in the Province of Angola was gazetted in Lisbon on September 23rd, 1918. The scheme includes: One 15-kw. station at Loanda; twenty-two 3-kw. stations at Cabinda, Maquela, Encoge, Malange, Luio, Saurimo, Novo Redondo, Lobito, Huambo, Quanza, Moxico, Caquengue, Mossamedes, Lubango, Mulongo, Cuanhama, Posto A, Cuangar, Cangamba, Caiundo, Dirico and Luati; nine 1½-kw. field stations (type F); two ½-kw. pack stations for the army.

These are followed by three field stations, for public and official service, situated respectively, and as a temporary measure, at Loanda, Novo Redondo and Lobito. The three latter are in the nature of experimental stations for testing the best means of arranging for future traffic. Up to the end of July, 1920, the traffic in words between these stations was as follows:—

Loanda (CRL)	..	..	..	262,376
Novo Redondo (CRN)	..	..	..	166,638
Lobito (CRO)	..	..	..	167,548

By the end of 1920 there had been open to public traffic, including shipping, coast stations at:—

Loando	..	..	..	15- and 3-kw.
Novo Redondo	..	..	..	3-kw.
Lobito	..	..	..	3-kw.
Mossanedes	..	..	..	3-kw.
Cabinda	..	..	..	3-kw.

together with the inland station of Huambo (of 3-kw.), situated 350 kilometres from the coast. All the stations are fitted with the Marconi Rotary Disc.

ADMINISTRATION.

The Laws, Regulations, etc., governing the administration of wireless telegraphy in this territory are identical with those used in Portugal.

PUERTO RICO

THE island of the "Greater Antilles" group in the West Indies known under the Spanish name of Rich Harbour lies with regard to latitude between 17° 50' and 18° 30' N.; its longitude ranging from 65° 30' to



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67° 15' W., and its total area comprising 3,606 square miles. The capital, San Juan, is 1,400 miles from New York and 982 from Key West, Florida. It is administered by a Governor appointed by the President of the United States, with a Cabinet composed of an Attorney-General, a Commissioner of Education, a Commissioner of Agriculture and Labour, a Commissioner of the Interior, a Commissioner of Health, and a Treasurer of Porto Rico; and a Senate and a House of Representatives elected for four years. With the exception of the Attorney-General and the Commissioner of Education, who are appointed by the President of the United States for four years, all of the other members of the Cabinet are appointed by the Governor with the advice and consent of the Senate of Porto Rico, also for four years.

CONTROL AND ORGANISATION.

The regulation of wireless telegraphy rests in the hands of the U.S. Navy Department, Washington, D.C., and no clubs or societies exist in the island. There are private stations worked by the South Porto Rico Sugar Company of Porto Rico (sugar factory), at Ensenada, P.R., connecting with Central Romana (a similar company in the Republic of Santo Domingo). The Ensenada station, owned by the South Porto Rico Sugar Company, is being operated under a general commercial licence granted by the U.S. Navy Department, Washington, D.C. It communicates directly with the Romana station, the Santo Domingo City public station, and San Pedro de Macoris station, in the Republic of Santo Domingo; also with ships at sea.

There are two stations belonging to, controlled and operated by, the Navy Department of the United States in Porto Rico, one in the city of San Juan and the other in the city of Cayey, P.R.

ADMINISTRATION.

The Laws and Regulations affecting radiotelegraphy in this island are identical with those current in the United States of America.

RHODESIA

CECIL RHODES, the "Colossus of South Africa" (*floruit* 1853-1902) has bequeathed his name to British Colonies covering an area of over 438,575 square miles. Rhodesia is bounded on the south by the Transvaal, on the north by the Congo State, and the Kenyaland Colony. On the east lies Portuguese East Africa, and on the west the Belgian Congo, Bechuanaland, and Portuguese West Africa.

For administrative purposes this vast territory is divided into Northern and Southern Rhodesia, the Rhodesian Chartered Company governing under the prescription of British Orders in Council.

Northern Rhodesia

In this Administrative Division the headquarters are located at Livingstone, and the district is mainly agricultural.

ORGANISATION.

With regard to Aviation Stations in this territory, aerodromes were constructed at Abercorn (close to Lake Tanganyika), Ndola, Broken Hill and Livingstone (the three latter being all on the railway line) in connection with the Cairo to Cape air flight, and these are to be maintained.

Southern Rhodesia

CONTROL.

Wireless Telegraphy is under the control of the Department of the Administrator, and the principal assistants of the Postmaster-General in such

matters are the Government Electrical Inspectors at Salisbury and Bulawayo. There are no wireless clubs or societies.



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ORGANISATION.

No licences have yet been issued for wireless installations in Southern Rhodesia, and the form of licence has not been fixed.

ADMINISTRATION.

Southern Rhodesia, whose centre is at Salisbury, regulates radiotelegraphy within its border by the "Electric Telegraph Amendment Ordinance" of 1904, and sundry Notices of 1912, the text of which will be found below.

It is possible that legislation and regulations will become necessary in connection with aerial navigation which is now in course of development, and efforts are being made to secure, as far as possible, uniformity with the proposed laws and regulations of the Union of South Africa on this subject.

No permanent arrangements have yet been made for the transmission of time and weather and meteorological signals.

A—Electric Telegraph Amendment Ordinance, 1904.

B—Postal Notice No. 55 of 1912.

C—Government Notice No. 391 of 1912.

TELEGRAPH (AMENDMENT) ORDINANCE.

A The term "electric telegraph" whenever used in the "Electric Telegraph Act, 1861," or any law amending the same or relating to "electric telegraphs," shall be interpreted as including any system or means of conveying signs, signals, or communications by electricity, magnetism,

electro-magnetism, or other like agency, and whether with or without the aid of wires, and including the system commonly known as wireless telegraphy, or aëtheric signalling, and any improvements or developments of such system; and the term "line of electric telegraph" shall be interpreted as including any apparatus, instrument, mast, standard, wire,

substance, matter, or thing whatever, which is, or may be, used for the purpose of sending, transmitting, conveying, or receiving such signs, signals, or communications.

2. The meaning of the term "person" shall be further extended so as to include individuals, partnerships, companies, and corporations.

3. The provision of the first section of the said Act as to its application to Southern Rhodesia shall be read and construed as including the territorial waters thereof.

4. Within Southern Rhodesia, or the territorial waters thereof, no person not thereto expressly authorised by some law shall erect or make use of any mast, standard, or apparatus of any kind, for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism, or other like agency, or shall erect or construct any line of electric telegraph, except under a licence to be granted by the Administrator.

5. The Administrator may authorise the issue of a licence for the establishment or use of any apparatus or installation for the transmission of signs, signals, or communications, by electric telegraph, with or without the aid of wires, and may revoke the same at any time, and there shall be payable annually in respect of such a licence such sum not exceeding One Hundred Pounds sterling, as may be fixed by regulation.

6. The terms and conditions of such licence, and the duration thereof, shall be subject to such regulations as may from time to time be made by the Administrator.

7. Any person who shall establish or use, or attempt to establish or use, any such apparatus or installation as is mentioned in Sections 1 and 4 of this Ordinance, in contravention of the provisions thereof, or of any other law relating to electric telegraphs, or of any regulation thereunder, shall be liable upon conviction to forfeit all apparatus so used, and to a penalty not exceeding Two Hundred and Fifty Pounds, and, in default of payment, to imprisonment, with or without hard labour, for a period not exceeding three months, and, in case of a second or subsequent conviction, in addition to such forfeiture to a penalty not exceeding Five Hundred Pounds, or in default of payment to imprisonment, with or without hard labour, for a period not exceeding six months.

8. Any Magistrate or Justice of the Peace before whom information shall be given on oath by credible persons, that the provisions of this Ordinance are being, or have been, or are likely to be infringed, may issue a search warrant, and authorise the seizure of any instruments, apparatus or appurtenances reasonably suspected to be intended for use in such contravention.

9. Notwithstanding the provisions of Section 4 of "The Electric Telegraph Act, 1861," all regulations made under the authority of that Act shall be published in the *Gazette*, and be subject, *mutatis mutandis*, to the provisions of Section 7 of Act No. 5 of 1883 of the Cape of Good Hope.

10. This Ordinance may be cited as the "Electric Telegraph Amendment Ordinance, 1904," and shall be read as one with "The Electric Telegraph Act, 1861," of the Cape of Good Hope, and the "Telegraph Protection Ordinance, 1901," and the said laws may be cited together as the "Electric Telegraph Laws, 1861 to 1904."

POSTAL NOTICE No. 55 OF 1912.

B Public attention is hereby directed to the provisions of the "Electric Telegraph Amendment Ordinance, 1904," under which no person not thereto expressly authorised by some law shall erect or make use of any mast, standard or apparatus of any kind for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism or other like agency, or shall construct any line of electric telegraph except under a licence to be granted by the Administrator.

The term "Line of Electric Telegraph" is defined as any apparatus, instrument, mast, standard, wire, substance, matter or thing whatever which is or may be used for the purpose of sending, transmitting, conveying or receiving signs, signals, or communications.

All persons having, or desiring to have, such lines of electric communication, including telephone lines, whether on their private property or otherwise, are hereby notified that application for licence to use such lines must be made to the Administrator through the Postmaster-General.

The licence fees payable in respect of such lines, as published in Government Notice No. 391 of 1912 are as follow:—

(a) 1s. per annum for a private telephone or telegraph line exclusively on the private property of the person constructing and using the same;

(b) 10s. per annum for a private telephone or telegraph line passing beyond the boundaries of the owner's land. (The licence does not confer any right to erect telephone or telegraph lines outside the boundaries of the applicant's land, and the applicant must make his own arrangements in this regard);

(c) £50 per annum for any installation of wireless telegraphy or telephony.

All persons having in use lines of electric communication which have not been authorised by the Administrator are hereby notified that unless the required permission be applied for within one month of the date of publication of this Notice they will render themselves liable to the penalties provided in Section 7 of the Telegraph Ordinance above referred to.

GOVERNMENT NOTICE.

No. 391 of 1912.

DEPARTMENT OF POSTS AND TELEGRAPHS.

The Treasury, Salisbury,

December 19th, 1912.

C It is hereby notified for public information that His Honour the Acting Administrator, with the advice of the Executive Council, has been pleased to approve of the following Regulations regarding the issue of licences for installations of private telephones, telegraphs, or other means of electric communication, whether with or without wires, in terms of section 5 of the "Electric Telegraph Amendment Ordinance, 1904."

By command of His Honour the Acting Administrator in Council.

P. D. L. FLYNN, Acting Treasurer.

When any person is authorised to establish

or use any means of electric communication as defined in the "Electric Telegraph Amendment Ordinance, 1904," the Postmaster-General may issue to such person an annual licence for the use of such line on payment in advance of the undermentioned fees, namely:—

(a) 1s. per annum for a private telephone or telegraph line exclusively on the private property of the person constructing and using the same;

(b) 10s. per annum for a private telephone or telegraph line passing beyond the boundaries of the owner's land. (The licence does not confer any right to erect telephone or telegraph lines outside the boundaries of the applicant's land, and the applicant must make his own arrangements in this regard);

(c) £50 per annum for any installation of wireless telegraphy or telephony.

ROUMANIA

THE country was formed by the fusion of the two Principalities of Moldavia and Wallachia on December 23rd, 1861, and its first ruler was Colonel Cuza, who had, in 1859, been elected "Hospodar" or "Lord" of the two Principalities. He assumed the Government under the title of Prince Alexandru Joan I. The total population is about six millions. It has not yet been possible to obtain the text of any radiotelegraphic laws and regulations, but it is hoped to include these in our next edition.

The existing wireless stations will be seen upon reference to the annexed map.

CONTROL.

The State alone may own wireless stations in Roumania. Authority to possess installations is, however, given to scientific institutions, and also to those engaging in special wireless research work.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
M. Emile Giurgea ..	Director of Herastreu (Bucharest) Wireless Station ..	Str. Renasterii 6, Bucharest
M. Nicolau Alexandre ..	Chief of the Wireless Station of Baneasa ..	Baneasa, Bucharest
Capt. Emile Geles ..	Chief of the Vaslui Wireless Station ..	Vaslui

The various classes of Radiotelegraphic stations are:—

(1)—Stations for International correspondence—

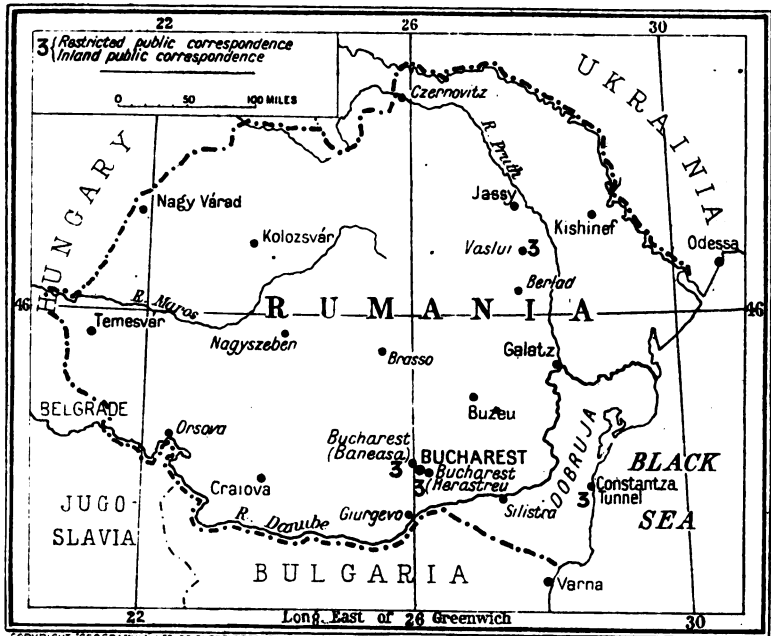
Bucharest (Herastreu),
Bucharest (Baneasa), and
Vaslui (Moldavia).

(2)—Stations for Internal correspondence—

- (i) Military Mobile Stations.
- (ii) Ship Stations.
- (iii) Stations for the River Danube Service.
- (iv) Naval Stations.
- (v) Small Stations for Aviation Service.

ORGANISATION.

In 1915 Bucharest was cut off from telegraphic communication with the West, and an improvised wireless station of 8–10 kw. (50 cycles) was constructed from laboratory apparatus. A second station with an alternator (100 cycles) was also constructed in the Carol Park, Bucharest, by means of which communication was established with Athens, Rome and Paris. Several months later the Ministry of War constructed a new station of about 20 kw. (100 cycles), which only worked over small distances because shortly after-



wards was erected at Herastreu (Bucharest) a 150 kw. station, system S.F.R. spark 1,000 cycles, with a horizontal antenna supported by eight towers 325 ft. high. At the same station there existed an S.F.R. installation of 15 kw. These two S.F.R. stations afforded excellent wireless communication until the evacuation of Bucharest in November, 1916, when the 15 kw. station was installed at Vaslui (Moldavia), where it is still located—and established communication with Salonica and the 150 kw. station at Botosani (North Moldavia), where it worked until the evacuation of the latter town (June, 1917). During the evacuation of Bucharest the Wireless Service was conducted by means of a 12 kw. station constructed by the Roumanians and installed on three wagons. After the evacuation of Botosani, being unable to reinstal at Jassy the 150 kw. station on account of the lack of three-phase current necessary for the electric motors, an improvised station of 15 kw. was constructed, driven by an automobile motor, and which worked at Jassy until December, 1918, establishing communication with Paris, Lyons, Coltano, etc. In January, 1916, the original Jassy station was closed down and re-erected at Bucharest (Military Wireless Station of Baneasa). The principal station at Herastreu (Bucharest), which was destroyed during enemy occupation, is being rebuilt. The eight metal towers, which were carried off by the Armies of Occupation, are being replaced by eight others about 365 ft. high, of which seven are ready. Whilst awaiting the proximate reinstallation of the 150 kw. station, a new 15 kw. station has been constructed on the spark system (600 cycles). The installation will soon be completed by a 50 kw. arc set, and will be fitted for automatic transmission and reception.

Before the evacuation of Bucharest, wireless telegraphy in its relation to meteorology was carried out at the wireless station at Herastreu (Bucharest), and regular communication was instituted with the Meteorological Services of Paris, Salonica and Budapest. As soon as the wireless station of Herastreu

(Bucharest) is reopened, this Meteorological Service will be again inaugurated, and will be worked in conjunction with the aviation centres.

ADMINISTRATION.

Roumania took part in the various International Radiotelegraphic Conferences. The laws concerning radiotelegraphy provide for articles established by Congress. The Radiotelegraphic Service is divided into four parts:—

- (a) International Correspondence (Office of Posts and Telegraphs and Ministry of the Interior).
- (b) Internal Correspondence, Army (Specialist and Aviation Battalion).
- (c) Navy.
- (d) Mercantile Marine (Roumanian Maritime Service and Ministry of Public Works).

RUSSIA

UNTIL March, 1917, this vast area was administered by the late ex-Czar Nicholas II, who was descended, in the female line, from Michael Romanoff, elected Czar in 1613 after the extinction of the House of Rurik. At the date above referred to, the Russian Duma carried through a *coup d'état*, as a result of which Czar Nicholas abdicated.

ADMINISTRATION.

Wireless Telegraphy is very extensively used throughout these wide territories; but we are not at present in a position to do more than reprint the old regulations. As far as can be ascertained, there are 16 wireless stations open for public service to ships and 14 for Government traffic only.

The following Statute and Regulations have been adopted for the institution of an inter-departmental Radiotelegraphic Committee:—

A—Statute.

B—Regulations.

C—Decree of February 20th, 1908.

STATUTE.

A 1. To establish the attached regulations concerning an inter-departmental Radiotelegraphic Committee and the necessary personnel.

2. To make Paragraph 1 effective as from July 1st, 1912.

3. To allot for the expenses of the said Committee (13,200 roubles annually) from the Imperial Treasury commencing from the year 1913 and to debit the expenses for 1912 (amounting to 6,600 roubles) to the anticipated surplus on the estimates for 1912.

REGULATIONS.

B 1. An inter-departmental Committee is instituted for the co-ordination of the work of the various departments relating to the existence and use of the Imperial network of radiotelegraphic and radiotelephonic stations and for the consideration of schemes for the establishment and maintenance of radiotelegraphic and radiotelephonic communication which require preliminary discussion between the departments affected thereby.

This Committee is attached to the Head-

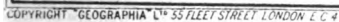
quarters Staff of the Postal Telegraph Department.

2. The Committee shall consist of a President and of permanent members appointed by the Ministries of the Interior, of War, or Marine, of Commerce and Industries, of Routes of Communication and of Foreign Affairs. When schemes for the establishment and exploitation of radiotelegraphic and radiotelephonic stations for the use of the Ministry of Finance or other departments are under consideration representatives of the department in question shall be appointed to attend the meetings of the Committee and have the right to vote.

When legal aspects of radiotelegraphic and radiotelephonic communication are under discussion a representative of the Ministry of Justice shall be invited to attend and shall have the right to vote.

3. The Ministers of the Interior, of War, of Marine, of Routes of Communication, and of Commerce and Industries shall each appoint two members to the Committee and the Ministry of Foreign Affairs shall appoint one member.

When necessary the Ministry of the Imperial Court shall appoint two representatives to attend the meetings of the Committee and the Ministry of Justice or other Ministries shall each appoint one member.



In the event of the representative of any of the Ministries being unable to attend the meetings of the Committee the Ministry in question may appoint a temporary substitute.

4. The President of the Committee and one of the permanent members of each department that furnishes two members must have special scientific and technical knowledge, and any temporary substitute appointed to represent these must be in possession of the same qualifications.

The President of the Committee shall be appointed by His Imperial Majesty on the recommendation of the aforesaid Ministers and the members of the Committee.

The members of the Committee can be appointed without any regard as to their rank.

During the absence of the President the fulfilment of his duties shall devolve upon one of the members appointed by the Minister of the Interior.

5. The duties of the Committee are as follows :—

(a) The examination of schemes which have been worked out by the various departments for radiotelegraphic and radiotelephonic installations with the object of co-ordinating them and of fitting them into a general plan for a network of radiotelegraphic and radiotelephonic stations throughout Russia.

(b) The regulation of the mutual relations between the radiotelegraphic and radiotelephonic stations of different departments during their operations.

(c) The examination of matter relating to communication between ship and shore stations.

(d) The consideration of proposals made by various departments for the issue of new laws, rules, and regulations concerning radiotelegraphic and radiotelephonic communication.

(e) The preparation of materials and questions to be brought forward by Russia for discussion at International Radiotelegraphic and Radiotelephonic Conferences.

(f) The drafting of general technical regulations, rules, and standards relating to radiotelegraphic and radiotelephonic installations.

(g) The investigation of the general requirements of Russia in the matter of specialists in radiotelegraphy and telephony, and in the matter of their education and of the right to radiotelegraphic and radiotelephonic communication.

(h) Action as consultants in connection with questions concerning radiotelegraphic and radiotelephonic communications which may be referred to the Committee by various departments and particularly the examination of and reporting upon the practical value of new inventions relating to radiotelegraphy and radiotelephony.

(i) All other matters and questions concerning radiotelegraphic and radiotelephonic communication.

6. All matters and questions relating to radiotelegraphic and radiotelephonic communication enumerated in Sections (a) to (e) and (h) of the preceding paragraph (5) shall be brought forward

by the various departments for the decision of the Committee.

Matters indicated in Sections (f), (g), and (i) of the same paragraph shall be examined by the Committee either on their own initiative or at the request of the departments interested.

7. Matters shall be submitted to the Committee in accordance with the instructions and resolutions of Ministers or Commanders-in-Chief in a complete form and with a definitely worded request from the department.

8. Communications between the President of the Committee and the Senate or the Chiefs of Headquarters or Chiefs of Departments or their subordinates or Governors shall be made in accordance with Clauses 233-236 of the Institution of Ministries.

9. For the preliminary technical consideration of complicated affairs the Committee shall be empowered to appoint, when required, special sub-committees consisting of members of the Committee who are particularly concerned in the matter and of well-informed persons who may be invited by the Committee and who will have the right to vote at the meeting of the sub-committees. At such meeting a member chosen by the Committee will preside.

10. For the carrying out of scientific and technical researches the Committee shall be permitted to use the laboratories of the Chamber of Weights and Measures and of other institutions in St. Petersburg, under conditions to be defined by special agreement between the Ministry of the Interior and other Ministries.

11. The final preparation and presentation of affairs to the Committee will be performed by one of the permanent members. Matters of a departmental character will be presented by a representative of the Ministry responsible for bringing the matter before the Committee for consideration.

12. The Committee will meet, by order of the President, at the Headquarters of the Postal Telegraph Department, not less than once per month, with the exception of the summer holiday-season, when meetings will be convened as required.

13. To form a quorum at meetings, the attendance is required of the representatives of the department which has introduced the business under discussion, and of at least one permanent member each from the Ministries of the Interior, of War, of Marine, and of Commerce and Industries.

14. All affairs in the Committee shall be decided by a simple majority of votes, each department having only one vote through its representatives. At meetings of sub-committees questions shall be decided by a simple majority of votes of all members of the sub-committee, including experts who may have been invited to attend the meetings.

In case of the votes of two parties being equal, the President shall give the casting vote.

15. In case of a department disagreeing with a decision of the Committee, the latter may, if they consider it necessary, refer the matter to the Council of Ministers.

16. In connection with each matter examined by the Committee a short protocol must be prepared, and signed at the same meeting by all members of the Committee who are present.



Independently of the protocols detailed journals of the meetings will be kept and these will include the opinions of the Committee concerning the business under consideration. In case of a division of votes the protocol and the journal must contain the opinions both of the majority and the minority, together with statement as to the Ministries which were included in each party.

17. The originals of journals and protocols will be kept with the documents of the Committee, but copies of the journals must be communicated within seven days to the Chiefs of Headquarters and to Chiefs of sections of those departments which are represented on the Committee.

18. The procedure to be followed in bringing matters before the Committee must be decided by the Committee and confirmed by the Minister of the Interior by agreement with other Ministers concerned.

19. The secretarial work in connection with the Committees shall be carried out by the secretary of the Committee, by his assistant, and by the officials allotted for the clerical work of the Committee.

20. The Secretary of the Committee shall be chosen by its President, whose choice must be confirmed by the Minister of the Interior. The appointment of the assistant secretary is confirmed by the President of the Committee. Only persons who have received a University education and who have a technical knowledge of radiotelegraphy and radiotelephony will be qualified to hold such posts.

The following are the principal provisions of the Decree concerning wireless telegraphy in Russia of February 20th, 1908 :—

By a "radiotelegraphic station" is understood every installation designated for telegraphic communications and capable of pro-

ducing on the spot or receiving from a distance electro-magnetic waves.

Stations of this kind comprise :—

(1) Stations designated for a special use.

(2) Stations designated for a general use, that is to say, open to accept telegrams from the public.

The form of administration, working, and supervision of radiotelegraphic stations are regulated by the personnel of the Telegraph Service, except in the case of the special and supplementary provisions to be eventually fixed.

The establishment of radiotelegraphic stations for public use and the general management of the Radiotelegraphic Service of the Empire are under the jurisdiction of the General Direction of Posts and Telegraphs. The various Government departments, having established radiotelegraphic stations for their special use, inform the General Direction of Posts and Telegraphs before opening the service at the named stations of their destination, power, range, and technical construction.

The carrying out by scientific associations and schools of public instruction of scientific experiments and researches in radiotelegraphy is subject to an authorisation, by special request, of the Minister for the Interior. These experiments, as well as the working of radiotelegraph stations for purposes of instruction, can be interdicted in cases where such experiments and instructions would exercise a harmful influence on neighbouring radiotelegraphic stations, or, in general, prejudice the interests of others.

Stations on board ships anchored in ports, or sailing near the coasts, are subjected to special regulations decreed by the Minister for the Interior in common accord with the Ministers of War, of the Marine, of Ways and Communications, of Foreign Affairs and of Commerce and Industry.

SAINT HELENA

THIS lonely little island, with an area forty-seven square miles, in the South Atlantic, lies about 800 miles from the nearest land (Ascension Island) and 1,200 miles from the West Coast of Africa. Its claim to fame rests upon the fact that it formed the place of exile of the great Napoleon.

St. Helena is an Admiralty coaling station and a resting place for the Eastern Telegraph Company's cable between Cape Town and St. Vincent (Cape de Verdes). The wireless installation is open for public service with ships.

ADMINISTRATION.

Wireless Telegraphy is administered under the following Ordinance and Regulations :—

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations.

ORDINANCE.

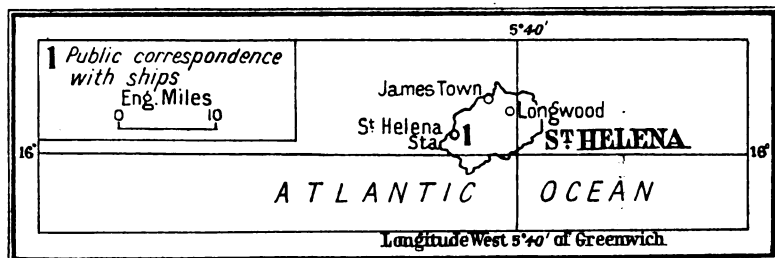
A The following Ordinance provides for the regulation of wireless telegraphy :—

1. From and after the passing of this Ordinance the Governor-in-Council may make regulations as he may deem requisite for regulating the use of wireless telegraphy on merchant

ships whether British or foreign while in the territorial waters of this Colony.

2. The Master of any ship and any person who shall act in contravention of any regulation now published or which may hereafter be published shall be liable on conviction to a penalty not exceeding ten pounds.

3. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."



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REGULATIONS.

B Made by the Governor-in-Council under Ordinance No. 7 of 1912, entitled "An Ordinance to provide for the Regulation of Wireless Telegraphy."

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of this Colony shall be worked in such a way as not to interfere with (a) naval signalling or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of this Colony except with the special or general permission of the Governor.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

SAINT KITTS-NEVIS

(See LEEWARD ISLANDS.)

SAINT LUCIA

(See map on p. 311.)

ST. LUCIA, lying 30 miles north-east of St. Vincent, possesses a total area of 233 square miles. One of the most notable features consists of a twin natural phenomenon known as the Pitons, great conical mountains, which lie at the mouth of Soufrière Bay. Castries, the capital, is on the western coast, near its northern extremity.

CONTROL AND ORGANISATION.

The wireless station, situated on the Morne Fortune overlooking the capital, was erected by the Admiralty in 1915, and is maintained and controlled by that Department. The officer in charge is a naval petty officer telegraphist and the operators are naval ratings.

ADMINISTRATION.

Wireless telegraphy is administered under an Ordinance of 1912 and various Regulations issued on its authority.

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations of November 25th, 1912.

C—Regulations of August 24th, 1914.

D—Regulations affecting Ship Stations, June 9th, 1917.

WIRELESS TELEGRAPHY ORDINANCE.

No. 10 of 1912.

A This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1912.
 2. In this Ordinance "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (a) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(b) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. (a) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(b) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(c) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (a) Any person who shall offend against any provision of this Ordinance or any of the

regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(b) Proceedings shall be taken before the First District Court on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraph Ordinance, 1903, is hereby repealed.

SCHEDULE—SECTION 5 (2).

REGULATIONS PASSED NOVEMBER

25TH, 1912.

B All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) The working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof; and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these regulations "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in charge or command of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS PASSED AUGUST

24TH, 1914.

C Whereas by Section 5 (3) of the Wireless Telegraphy Ordinance, 1912, it is enacted that if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless

telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time; and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas, in my opinion, such emergency as aforesaid has arisen :—

Now I (the Acting Administrator) do hereby make the following further Regulations namely :—

1. The Governor may appoint any person to take possession and control of the apparatus for wireless telegraphy on board of any merchant ship while in the territorial waters of the Colony.

2. Any person so appointed may enter upon any such ship and take possession of the aforesaid apparatus thereon on behalf of His Majesty, and use the same for His Majesty's Service, and subject thereto for such ordinary services as to the said person may seem fit.

3. Any such person may instead of taking possession of such apparatus as aforesaid direct the master of the ship to submit or cause to be submitted to him all messages intended for transmission or arriving by the said apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him, and generally to obey all such directions with reference to the transmission of messages as such person may prescribe and the master of the ship shall obey and conform to all such directions. Any

master failing to obey and conform to any such direction shall be liable on summary conviction to the penalties provided under the Ordinance.

REGULATIONS MADE BY THE GOVERNOR.

OPERATION OF SHIP STATIONS WITHIN THE TERRITORIAL WATERS OF THE COLONY.

June 9th, 1917.

D 1. The radiotelegraph stations on board ships (other than His Majesty's ships of war or ships of war of his Allies) shall not be worked whilst such ships are within the territorial waters of the Colony.

2. For the proper enforcement of the above ships of British register in the territorial waters of the Colony must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging in such a manner as to show they are properly disconnected.

3. Ships of foreign register in the territorial waters of the Colony must—subject to the provisions of the following Regulation 4—take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

4. Ships of foreign register remaining in the territorial waters of the Colony for less than twelve hours may, at the discretion of the competent naval authority, or the person appointed by the Governor for the purpose, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of Regulation 2 of these regulations.

SAINT VINCENT (B.W.I.)

ST. VINCENT, lying 30 miles south-west of St. Lucia and 97 miles west of Barbados, comprises an area of 140 square miles.

ADMINISTRATION.

No wireless stations exist in this Colony, but wireless telegraphy would be administered under an Ordinance and Regulations which figure below.

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations.

ORDINANCE.

A This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor in Council may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(2) The Regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such

further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the Police Magistrate of the First District on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. "The Wireless Telegraph Ordinance, 1904," and "The Wireless Telegraph Amendment Ordinance, 1912," are hereby repealed.

REGULATIONS.

- B** 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony

shall be worked in such a way as not to interfere with—

(a) Naval signalling, or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. Regulations made by the Governor in Council on the 17th day of December, 1912, under the authority of the Wireless Telegraphy Ordinances, 1904 and 1912, are hereby repealed

SALVADOR

THE independent Republic of El Salvador is situated on the West Coast of Central America, and occupies an area estimated at 7,255 square miles. The population, according to the Census of 1914, numbers 1,254,151. It originated in the course of the dissolution of the Central American Federation.



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(Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica) which took place in 1839.

The form of Government is Republican, and there are three branches of Administration: (1) The Executive, which comprises the President and Cabinet Ministers; (2) the Legislature or National Assembly; and (3) the Judiciary.

CONTROL AND ORGANISATION.

The first wireless station was erected by the Government and inaugurated in September, 1917. It is situated at the southern end of the city of San Salvador, near the military post "El Zapote." This is a private Government station, and is not open to public service. The station was presented to this Government by the Government of Mexico, and is known by the name of "Estación Venustiano Carranza."

Radiotelegraphy is not a State monopoly, private companies or individuals being allowed to erect or work wireless installations with the consent of the Government, provided that the present contract with the Cable Company be not thereby infringed.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Señor Don Cecilio Bustamante..	Minister of Public Works	San Salvador
Señor Don Ricardo Posada ..	Director of Telegraphs	San Salvador

ADMINISTRATION.

At present there are no special laws regulating wireless telegraphy, and the only publication which deals with this subject is the *Revista Telegrafica*, the official organ issued by the Director-General of Posts and Telegraphs, wherein are reported any such notices and items.

SAMOA ISLANDS

(See map on p. 356.)

SANDWICH ISLANDS

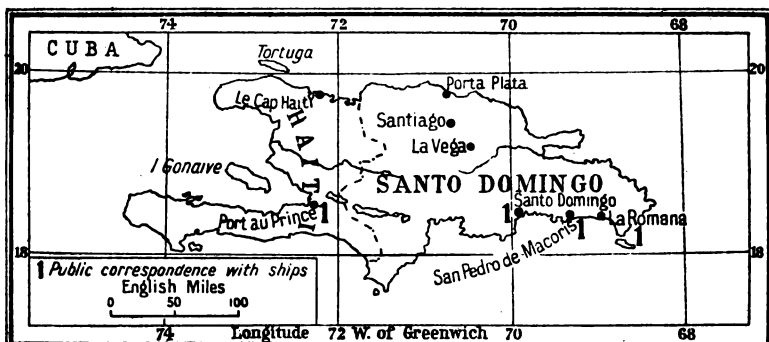
(See UNITED STATES OF AMERICA.)

SANTO DOMINGO (DOMINICAN REPUBLIC)

THE island of Santo Domingo is divided between two States, the Western being the Republic of Haiti, the Eastern the Republic of Santo Domingo. French is the official language of the former, Spanish of the latter. The first constitution of the Dominican Republic bears the date of November 18th, 1844; it has been amended several times, and the one in force at present bears the date of February 22nd, 1908. The President administers the Executive, the Legislative functions devolving on a National Congress with two Chambers, the Senate and Cámara de Diputados (House of Deputies). The United States landed troops in May, 1916, and is supervising the administration for the present. The Republic covers an area of 50,000 square kilometres, and is divided into twelve provinces. The population is calculated at 700,000 inhabitants.

CONTROL.

The supervision of the wireless service is under the control of the Superintendent of Telegraphs, who, in turn, is subordinate to the Director-General of Posts and Telegraphs, under the Department of "Fomento y Comunicaciones."



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OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Lieut.-Comdr. R. M. Warfield, C.E.C., U.S. Navy	Officer in Charge of the Department of "Fomento y Comunicaciones" ..	Government Palace, Santo Domingo City
Mr. E. H. Hathaway	Director-General of Posts and Tele- graphs	Senate Building, Santo Domingo City
Dr. Eduardo R. Soler, C.E. ..	Superintendent of Telegraphs ..	Santo Domingo City
Mr. F. Lindemuth	Electrical Gunner, U.S.N. ..	Wireless Telegraph, Santo Domingo City
Mr. J. R. Saladin	Chief of Wireless and Telephone Station	San Pedro de Macoris
Mr. Francisco Ortiz	Operator of Radio Station ..	San Pedro de Macoris

ORGANISATION.

The first land wireless station was erected at the capital city of Santo Domingo in 1908. The apparatus, supplied by the de Forest Company of New York, did not work satisfactorily, and despite the using of a power of 20 kw., only established irregular communication with Puerto Rico. After a lapse of five years, a 2-kw. set was installed in September, 1913, and regular public communication was instituted with Puerto Rico. In addition to this publicly owned station, there is a station at La Romana (in the Province of Seybo), owned by the (Sugar Refining) Central Guanica Company in Puerto Rico. The latter relays to the British Cable Company in Puerto Rico, and thus touch is maintained with the outside world. There is also another station open for public service with ships.

In March, 1919, the two kilowatt set in the Radio Station of Santo Domingo was replaced by a new set, which includes one Radio Transmitter "Marconi System," of 5 kilowatts, 500 cycles, of 250 volts, alternating current.

Communication can now be made direct with San Juan, Puerto Rico, without the intervention of the Ensenada Station. The transmission of messages *via* Ensenada is now assured by day as well as by night, excepting when there are electric disturbances. It is also possible to have direct communication with Guantanamo, Cuba, especially at night, and with Port-au-Prince, Haiti.

Two steel towers, each 225 feet high, have been erected for the antennæ, which are 500 feet in length.

A small station belonging to the Republic was installed on April 13th, 1914, at San Pedro de Macoris, a town on the southern coast of Santo Domingo. This is utilised for communication with the station at Santo Domingo City, with the central Romano station, and with ships approaching the port.

ADMINISTRATION.

The only legislation on the subject of radiotelegraphy consists of a special law passed June 8th, 1911, and published in the *Official Gazette*, No. 2207 of July 8th, 1911. This law exempts from taxation enterprises of public utility.

There is also in force a public contract with the Central Guanica and Central Romana (Sugar Refining) Companies, dated December 19th, 1913. This lays down the conditions under which the two companies conduct for the Dominican Government Public Radiotelegraphic Service through the medium of their stations.

Clause I deals with the rates per word for foreign messages, which for the general public amounts to 30 cents per word.

Clause II deals with radio rates in the island—8 cents per word.

Clause III deals with special rates for officials of the States and the two companies, press rates, etc.

Clauses IV, V, and VI deal with matters and methods of accounting.

SARAWAK

(See BORNEO, BRITISH.)

SEYCHELLES ISLANDS

THIS Colony consists of a group of islands belonging to Great Britain, almost in the middle of the Indian Ocean, and 600 miles north-east of Madagascar. Formally associated with Mauritius, the Colony of Seychelles was at one time administered from that island; but in 1888 a special Administrator was created, and the occupant of the post in 1903 was raised to the rank of Governor.

The principal island is Mahé (52½ square miles), and the Colony includes a number of dependent islands, which bring its total estimated area up to 156 square miles.

CONTROL AND ORGANISATION.

There are no private or commercial wireless installations. The only installation in the Colony was erected in 1915 at North-West Bay, Mahé, and belongs to the Admiralty.

There is no official of the Seychelles Government Service who is specially charged with the supervision of radiotelegraphy. Its control forms part of the general administration, of which the principal personnel will be found below.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Lieut.-Col. the Hon. Sir Eustace Fiennes, Bart.	Governor and Commander-in-Chief	Mahé
Mr. E. R. Logan	Chief Justice	Mahé
Mr. P. B. Pedrides	Legal Adviser and Crown Prosecutor	Mahé
Mr. E. Taylor	Treasurer and Collector of Customs	Mahé
Dr. J. B. Addison, O.B.E.	Chief Medical Officer	Mahé
Mr. G. C. du Boulay	Private Secretary	Mahé

ADMINISTRATION.

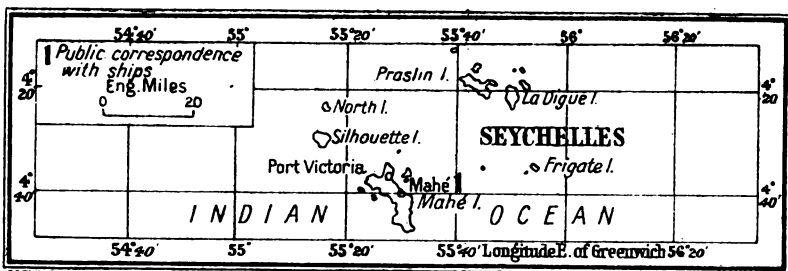
Radiotelegraphy is administered under the Ordinances, the text of which will be found below, and which cancel "The Telegraphic and Electrical Stations Ordinance, 1903," printed in our former issues.

The list of current rules here included is as follows :—

A—Ordinance No. 3 of 1914.

B—Ordinance No. 11 of 1917.

C—Regulations (No. 127) thereunder.



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ORDINANCE NO. 3 OF 1914.

Dated February 19th, 1914.

Enacted by the Governor of the Colony of Seychelles with the advice and consent of the Legislative Council thereof.

A To provide for the regulation of wireless telegraphy.

Be it enacted by the Governor of the Colony of Seychelles with the advice and consent of the Legislative Council thereof, as follows:—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1914."

2. In this Ordinance and in any regulation made thereunder the expression "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may whenever he shall deem it expedient to do so licence the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor in Executive Council may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding two thousand rupees (Rs. 2,000) or to imprisonment for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance without the previous sanction of the Crown Prosecutor.

(2) If the Chief Justice or the Police Magistrate is satisfied by information on oath

that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any Police Officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor in Executive Council may make regulations for all or any of the following matters:—

(i) for prescribing the form and manner in which applications for licence under this Ordinance are to be made;

(ii) for prescribing the fees payable on the grant of any licence;

(iii) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the waters thereof and so as to not interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(iv) for prohibiting except with the special or general permission of the Postmaster of the Colony the working or using of any apparatus for wireless telegraphy on board a merchant ship whether British or foreign whilst such ship is in any of the harbours of the Colony;

(v) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships whether British or foreign in the waters of the Colony the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraph (iii) (iv) and (v) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper but shall not be subject to any rent or royalty.

8. Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulations made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of one thousand Rupees (Rs. 1,000).

9. Ordinance No. 4 of 1903 is hereby repealed.

ORDINANCE NO. 11 OF 1917.

AN ORDINANCE TO AMEND ORDINANCE NO. 3 OF 1914.

Dated September 1st, 1917.

B Be it enacted by the Governor of the Colony of Seychelles by and with the advice and consent of the Legislative Council thereof, as follows:—

1. This Ordinance may be cited as "The Wireless Telegraph (Amendment) Ordinance, 1917," and shall be construed as one with the Wireless Telegraph Ordinance, 1914.

2. Section 6 (iv) of the Wireless Telegraph Ordinance, 1914, is hereby repealed and replaced by the following:—

(iv) For prohibiting except with the general or special permission of the Governor, the working or using of any apparatus for wireless telegraphy on board any ship whether British or foreign other than His Majesty's ships of war, whilst such ship is in the waters of this Colony and for the control or disposal of any apparatus, instrument or thing which may be used in connection with wireless telegraphy on board any ship (other than His Majesty's ships of war) whilst such ship is in the waters of the Colony.

3. Section 6 (2) of the Wireless Telegraph Ordinance, 1914, is hereby repealed.

4. (1) The Governor may appoint officers for the purpose of seeing that the provisions of the Wireless Telegraph Ordinance, 1914, as amended by this Ordinance, and any regulations made thereunder are complied with and it shall be lawful for such officers to go on board any ship whether British or foreign whilst any ship is at anchor in the waters of the Colony to see that such provisions are complied with.

(2) If any such officer is molested, obstructed, hindered or insulted while in the execution of his duties an offence shall be deemed to have been committed.

5. For the purpose of any proceedings under the Wireless Telegraph Ordinance, 1914, as amended by this Ordinance, or under any regulations made thereunder, the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship and for any breach of the Wireless Telegraph Ordinance, 1914, as amended by this Ordinance, and any regulations made thereunder.

6. Any summons or other document in any proceedings under the Wireless Telegraph Ordinance, 1914, as amended by this Ordinance, shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

7. The regulations published in *Gazette* No. 22 of 1914 under Government Notification No. 52 of 1914 are hereby repealed.

Passed in the Legislative Council at a meeting held on the 27th August, 1917.

REGULATIONS.

No. 127 of 1917.

C 1. The radiotelegraph stations on board ships (other than His Majesty's ships of war) shall not be worked whilst such ships are within any harbour or bay of the Colony.

2. For the proper enforcement of section 1 of these regulations ships of British register in any harbour or bay of the Colony must completely disconnect their aerial wires from their radio apparatus, the ends of such wires being suspended entirely clear of the radiotelegraph cabin, preferably from the main rigging, in such a manner as to show they are properly disconnected.

3. (1) Ships of foreign register in any harbour or bay of this Colony must, subject to the provisions of sub-section 2 of this section, take down their aerial wires completely and disconnect the same from their radiotelegraph apparatus.

(2) Ships of foreign register remaining in a harbour or bay of this Colony for less than twelve hours may, at the discretion of the Governor, be permitted to leave their aerials up, provided the same are disconnected in accordance with the provisions of section 2 of these regulations.

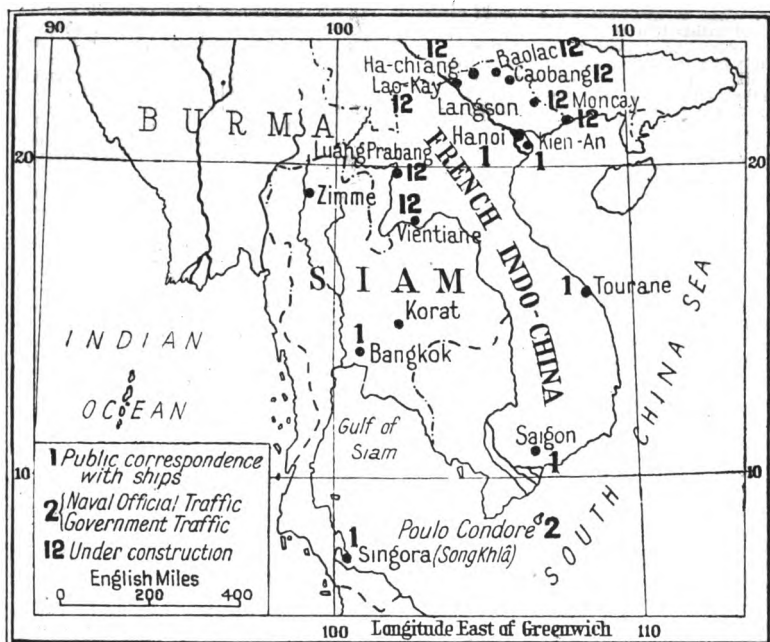
4. Any officer appointed under the provisions of section 4 of Ordinance No. 11 of 1917 may order that the radiotelegraph cabin on board any ship (other than His Majesty's ships of war) be sealed and he shall thereupon affix his seal to such cabin.

If any seal so affixed is removed or tampered with an offence shall be deemed to have been committed against these regulations.

Made by His Excellency the Governor in Executive Council at a meeting held on the 24th day of September, 1917.

SIAM

THE Kingdom known to us as Siam, to the natives as Muang Thai, lies between British Burma and French Indo-China. Its integrity is guaranteed by France and Great Britain under mutual agreement. The form of government is an absolute monarchy, with an Executive Council of Ministers.



The total area of Siam (inclusive of all the islands) measures about 240,000 English square miles. The coast line extends approximately over 2,000 miles, and geographically Siam lies between $5^{\circ} 40'$ and $20^{\circ} 20'$ N. latitude, and between $97^{\circ} 5'$ and $105^{\circ} 0'$ E. longitude. The greatest distance east to west is estimated at about 510 miles, and that from north to south 1,005 miles.

CONTROL.

Originally radiotelegraphy was organised in Siam under supervision of the Minister of Marine, but it is now controlled by the Ministry of Communications. The first stations erected were those at Saladeng in Bangkok (lat. $13^{\circ} 44' 32.49''$ N., long. $100^{\circ} 29' 22.30''$ E.), and at *Songkhla (lat. $7^{\circ} 10' 0''$ N., long. $100^{\circ} 36' 12''$ E.); both these land stations are directly controlled by Government.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Commander Phra Vidyu Duralikhit ..	Head of Radiotelegraphic Department	Bangkok
Commander Phra Vidyu Duralikhit ..	Chief Engineer, Wireless Station ..	Bangkok
Lieut.-Commander Luang Jarnarn-Aggikich ..	Assistant Engineer, Wireless Station ..	Bangkok
Junior Lieut. Add Tanucing ..	Principal Assistant	Bangkok
Junior Lieut. Mee Pathamanavin ..	Principal Assistant	Songkhla

ORGANISATION.

There are experimental, amateur, and instructional stations at Saladeng. There are also ship stations on Government vessels.

* Sometimes spelt "Singora."

ADMINISTRATION.

The law and regulations under which radiotelegraphy is administered in Siam will be found below.

A—Radiotelegraph Act, B. E. 2457 (1914).

B—Notice concerning the opening of Radiotelegraphy for Public Service, B. E. 2462 (1919).

C—Ministerial Regulations relating to the use of Radiotelegraphy, B. E. 2462 (1919).

RADIOTELEGRAPH LAW.

A This Law may be cited as "The Radiotelegraph Law, B.E. 2457" (1914).

2. It shall come into force from the date of its publication in the Government Gazette.

COAST AND LAND STATIONS.

3. The right to establish and work radio-stations for telegraphic and telephonic purposes on Siamese soil and on board ships permanently anchored in Siamese territorial waters is an exclusive privilege of the Government.

This privilege shall be reserved to the Department of Posts and Telegraphs in the Ministry of Communications.

4. The Army and Navy may establish and work independently radiotelegraph stations or field apparatus subject to such conditions as may be from time to time sanctioned in writing by the Minister of War or Marine.

Any station established under this section may be opened to public correspondence only under special arrangement with the Department of Posts and Telegraphs.

SHIP STATIONS.

5. No merchant ship under the Siamese flag shall establish or work any radiotelegraph or telephone apparatus without a licence from the Minister of Communications.

The Minister of Communications shall not grant such licence until he has been satisfied that the apparatus can work in accordance with the provisions of the International Radiotelegraph Convention of London, 5th July, 1912, and will be handled by qualified operators.

Such licence shall be for such time and subject to such conditions as the Minister of Communications may deem good.

6. No ship, whether under the Siamese or a foreign flag, excepting ships of war, is allowed while in Siamese territorial waters to send a message by means of her radiotelegraph apparatus when and where such message can be forwarded by the Government system, either with or without wires, except for the purpose of transmitting messages to or from a ship in distress.

SECURITY.

7. No person or persons engaged in or having knowledge of the operation of any radio-station shall disclose the contents of any message transmitted or received by such station for the purpose of transmission, except to the person to whom the same may be directed or his authorised agent, or to another station employed to forward such message to its destination, or in obedience to the directions of a Court of competent jurisdiction.

PENALTIES.

8. Whoever establishes or works any apparatus contrary to the provision of Sections 3

and 6, or in excess of the conditions laid down under Section 4 of this Law, shall be punished with imprisonment not exceeding six months or fine not exceeding five hundred ticals or both.

The captain or master of a ship, and the person directly responsible for the offence, if any, shall both be liable to punishment for every infringement of the provisions of Section 6.

9. Any person infringing Section 5 of this law shall be punished with fine not exceeding one hundred ticals.

10. Upon the conviction of any person of an offence under the foregoing sections, the Court may order the forfeiture of any apparatus used for the commission of such offence.

11. Any person injuring apparatus or committing any act of mischief to a radiotelegraph station lawfully established, or doing anything to prevent or intended to prevent the transmission or delivery of any radiotelegraph message by any such station, shall be guilty of an offence under Section 196 of the Penal Code.

12. Whoever commits any offence against Section 7 of this Law shall be punished under Section 279 to 281 of the Penal Code.

EXECUTION.

13. The Minister of Communications shall have charge and control of the execution of this Law.

It shall be lawful for him to frame regulations and to fix the scale of fees for land, coast, and ship charges in the transmission of messages by radiotelegraphy or telephony, as well as for licences under Section 5.

It shall also be lawful for him to frame regulations about the qualifications required from operators.

All such regulations shall be in accordance with the detailed Service Regulations appended to the International Radiotelegraph Convention.

Such regulations, on being sanctioned by His Majesty and published in the Government Gazette, shall be deemed to be part of this Law.

Given on the 24th day of April, B.E., 2457 (1914), being the 1,261st day of the Present Reign.

BY THE KING'S MOST EXCELLENT MAJESTY.

Whereas His Majesty's Government has always reserved to itself the exclusive right to establish and work means of telegraphic and telephonic communications throughout Siam;

And whereas apparatus for wireless telegraphy has now been devised practicable for use by land and sea;

And whereas it is desirable that ships under the Siamese flag, more specially passenger carriers, should be equipped with such apparatus, worked under proper regulations, for the greater safety of life at sea;

And whereas the regulations necessary to insure the proper and efficient working of wireless

telegraphic stations must conform in all respects with the provisions of the International Radiotelegraph Convention of London, 1912, to which His Majesty's Government has been a party;

Therefore His Majesty has been pleased to enact the following law:—

NOTICE CONCERNING THE OPENING OF RADIO-TELEGRAPHY FOR PUBLIC SERVICE.

Dated 22nd May, 1919.

B In view of the progress made in commerce and trade in this country, it is considered that the use of Radiotelegraphy which was originally established by the Royal Government for its own use should be extended to general public.

The Ministry of Communications having submitted these facts before His Majesty the King, has now obtained the Royal Permission that the Naval Radiotelegraphic stations in Bangkok and at Singora (Songkhla) should be open to public use from the 1st June, 1919.

The public radiotelegraphic service will be under the management of the telegraph officials of the Post and Telegraph Department, who will receive and despatch radiotelegraphic telegrams in a similar manner to the despatch of other telegrams in the Kingdom.

Senders of radiotelegraphic messages should write clearly the words "Wireless Telegraph" on the upper left-hand corner of the form supplied, before the names of the persons for whom the messages are destined.

(Sd.) 1st Grand Councillor,

Chao Phya Wongsa Nuprabadh,
Minister of Communications.

MINISTERIAL REGULATIONS FOR THE LICENSING OF RADIO-TELEGRAPHY UPON SHIPS, THE ISSUING OF CERTIFICATES OF COMPETENCY TO RADIO-TELEGRAPH OPERATORS, THE FIXING OF FEES FOR SUCH LICENCES AND CERTIFICATES AND THE FIXING OF FEES FOR LAND, COAST AND SHIP CHARGES IN THE TRANSMISSION OF MESSAGES BY RADIO-TELEGRAPHY.

C Whereas under Sections 5 and 13 of the Radiotelegraph Law, B. E. 2457, the Minister of Communications is empowered to licence the establishment and working of radiotelegraph apparatus upon merchant ships under the Siamese Flag, to frame regulations about qualifications required from operators and to fix the scale of fees for land, coast and ship charges in the transmission of messages by radiotelegraphy, such Regulations, on being approved by His Majesty and published in the Government Gazette to be deemed to be part of the Law.

It has now pleased His Majesty the King to authorise the Minister of Communications to issue the following Ministerial Regulations:—

1. The operation of radiotelegraph stations upon any merchant ship under the Siamese Flag must conform to the provisions of the International Radiotelegraph Convention of London, July 5th, 1912, the detailed Service Regulations appended to the said International Radiotelegraph Convention, the Radiotelegraph Law, B. E. 2457 and any amendments and alterations which may be made therein, and the regulations from time to time issued by the Minister of Communications under the authority of said Radiotelegraph Law, B. E. 2457.

2. No person shall work the radiotelegraph upon any merchant ship within Siamese territorial waters in such a way as to interrupt or interfere with

(a) Naval or military signalling.

(b) The transmission of messages between other radiotelegraph stations lawfully established.

3. Before the installation of any radiotelegraph apparatus upon any merchant vessel under the Siamese Flag, an application shall first be filed with the Minister of Communications, according to Form A of Schedule I, attached hereto. If the Minister of Communications is satisfied that the apparatus described in said application, will, when installed, be capable of working in accordance with the requirements of Section 4 (a) of these Regulations, an installation licence will be issued according to Form B. of said Schedule I. When the installation is completed, the applicant shall notify the Minister of Communications, who, thereupon, will cause an inspection to be made. If this inspection is satisfactory, the Minister of Communications will issue a ship licence according to Form C, and subject to the conditions therein contained. Such ship licence shall be good until March 31st after its date, but may be renewed within one month immediately after the expiration of the period for which it was issued. Such installation licences and ship licences shall be executed in duplicate, one copy to be retained by the Ministry of Communications and the other given to the licensee.

4. The Minister of Communications shall not grant such ship licence unless he is satisfied that—

(a) the radiotelegraph apparatus can be worked in accordance with the provisions of the International Radiotelegraph Convention of London and the detailed Service Regulations appended thereto, and that,

(b) operators qualified in accordance with the provisions of these Regulations and who are the holders of the certificates provided for herein will be employed to work the same.

5. A separate licence is required for each ship belonging to the same owner.

6. The fee for the issuance of each ship licence shall be 5 Bahts and a fee of the same amount shall be charged for each renewal thereof.

7. No person shall work a radiotelegraph on board any merchant ship under the Siamese Flag unless he holds either a first or second-class certificate of competency granted by the Minister of Communications.

8. The Minister of Communications shall grant certificates of competency in accordance with the conditions contained in the second Schedule to these Regulations.

9. Should a holder of a certificate of competency granted under these rules be proved to the satisfaction of the Minister of Communications wilfully or negligently to have failed to comply with the provisions of the International Radiotelegraph Convention of London, July 5th, 1912, the detailed Service Regulations appended thereto, the Radiotelegraph Law, B. E. 2457 or the Regulations issued by the Minister of Communications, or any amendments or modifications of any of these or any other Regulations which may be issued from time to time for his guidance, the Minister of Communications may cancel the certificate.

10. The Minister of Communications of any officer authorised by him may require the holder of a certificate of competency to produce the same for cancellation under Regulation 9, and the holder must comply with such requisition.

11. Nothing in these Regulations shall apply to the use of the radiotelegraph for the purpose of making or answering signals of distress.

12. Rates for messages transmitted to or received from ship stations, shall be as follows:—

Coast station transmitting or receiving charge for radiotelegrams to or from ships, 20 satangs (0.40 francs) per word with a minimum charge of 2 Bahts (4.00 francs).

Land charges for the receipt or transmission of radiotelegrams over the Inland Telegraph

System shall be those provided in the published tariff for inland messages. Land charges shall in addition include the actual expenses of postage or carriage, if the message is to be delivered outside of established telegraph districts.

Charges for relaying messages outside of Siam shall be fixed in accordance with published international tariffs.

These rates may be modified or supplemented and rates fixed for the charges at ship stations by the Minister of Communications.

SCHEDULE I.

Conditions and Forms of application for Licence to instal Radiotelegraph Apparatus on ships Installation Licence, and Ship Licence.

I.

Application for installation licences shall be made according to the following form:—

FORM A.

I,.....of.....the owner of the ship.....do hereby make application for permission to instal upon said ship apparatus for radiotelegraphy according to the following specification:—

SPECIFICATION.

Name of Ship.	Normal range of Signalling in Nautical Miles		Character of Apparatus		Source and Maximum Output	Power		If Alternator is used, Number of Cycles per second
	by day	by night	Description of Receiving Apparatus	Wave-length in Metres		Maximum taken by Transmitting Instruments.		
1	2	3	4	5	6	7	8	9

The above described apparatus will be installed in.....months.

Signed.....

II.

Licence for installation of Radiotelegraph Apparatus upon ships shall be according to the following form:—

FORM B.

Licence for installing Radiotelegraph Apparatus.

Whereas.....of.....has filed with the Ministry of Communications his application dated.....for the installation of radiotelegraph apparatus upon the ship.....

Now the Minister of Communications does hereby licence and permit the installation upon the said ship within the period of.....months from date of radiotelegraph application in accordance with the following specification:

Name of Ship.	Normal range of Signalling in Nautical Miles.		Character of Apparatus		Source and Maximum Output	Power		If Alternator is used, Number of Cycles per second
	by day	by night	Description of Receiving Apparatus	Wave-length in Metres		Maximum taken by transmitting Instruments.		
1	2	3	4	5	6	7	8	9

This licence and permission does not permit the licensee to operate said apparatus above described until after its inspection when installed and the issuance of a ship licence.

Signed.....
Minister of Communications.

III.

The ship licence provided for in Regulation 3, shall be in the following form and subject to the following conditions:—

FORM C.

Know all men by these presents that, whereas.....of.....hereafter called the "licensee," is desirous of establishing, maintaining and working on the ship..... belonging to the licensee, radiotelegraphy under Section 5 of the Radiotelegraph Act, B. E. 2457;

And whereas the licensee has agreed and by the acceptance of this licence, does become bound to operate and maintain the radiotelegraph installation for which this licence is granted in accordance with the International Radiotelegraph Convention of London of July 5th, 1912, the detailed Service Regulations appended thereto, the Radiotelegraph Law, B. E. 2457, and the Regulations thereunder by the Minister of Communications, and any and all amendments and modifications of any of these, which may be made from time to time;

Now the Minister of Communications hereby grants to the licensee during the term or period commencing with the date hereof and terminating on the 31st day of March, B. E. 24.... (19), licence and permission;

(1) To establish, maintain and work for the purpose hereinafter mentioned upon the ship..... but subject in all respects to the provisions of said International Radiotelegraph Convention of London, July 5th, 1912, to the Service Regulations appended thereto, the Radiotelegraph Law of B. E. 2457, and the Regulations issued by the Minister of Communications, and all amendments and modifications of any of these, apparatus for radiotelegraphy known as the..... system of radiotelegraphy.

(2) To transmit and receive messages by means of the licensed apparatus between the said ship and coast stations and other ship stations;

(3) To receive money or other valuable consideration for or in respect to the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus, according to the schedule of charges fixed in the Regulations or by the Minister of Communications.

And it is hereby declared that the said licence and permission is granted upon and subject to the following further conditions and provisions:—

(1) The licensed apparatus shall not be used by the licensee or by any other person either on behalf of or by permission of the licensee for the transmission or receipt of any messages except those authorised by this licence.

(2) (a) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval or Military signalling or with any radiotelegraph station lawfully established.

(b) If at any time it becomes apparent that the working of the licensed apparatus upon said ship is inconsistent with the free use of naval or military signalling the licensee shall when required so to do by the Minister of Communications close said station upon said ship.

(3) The licensee shall comply with all such directions and observe all such rules and regulations as may be given or made by the Minister

of Communications from time to time for the purpose of preventing interference with the working of any other radiotelegraph station and for enabling the messages exchanged by means of the licensed apparatus, to be distinguished from those emanating from any other radiotelegraph station.

(4) The licensee shall at all times indemnify His Majesty's Government, the Minister of Communications and the Department of Posts and Telegraphs against all actions, claims and demands which may be brought or made by any corporation, company or person in respect of any damage arising from any act licensed or permitted by these presents.

(5) Subject to the provisions of this licence, the licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or precedence whether as regards rates of charge, order of transmission or otherwise. except that preference shall be given to messages transmitted on behalf of His Majesty or of His Majesty's Government.

(6) The licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus, or any other means in the power of the licensee.

(7) The licensed apparatus shall be worked only by a person holding a certificate of competency issued by the Minister of Communications.

(8) The licensee shall not divulge to any person other than properly authorised officials of His Majesty's Government or make any use whatever of any message coming to the knowledge of the licensee through naval or military signalling.

(9) The licensee shall keep such accounts records and registers of all messages transmitted by means of the licensed apparatus as the Minister of Communications may from time to time require and such accounts, records and registers shall be open to the inspections of the Minister of Communications or his duly authorised representative at all reasonable times.

(10) The Minister of Communications or his duly authorised representative may at all reasonable times enter upon said ship for the purpose of inspecting and may inspect any apparatus fixed or being in such ship for the purpose of sending and receiving messages by radiotelegraphy, and the method of working such apparatus.

(11) The Minister of Communications may at any time by notice in writing but without assigning any reason revoke and determine this licence and thereupon this licence shall determine and become absolutely void.

(12) Any notice, request or consent (whether required to be in writing or not) to be given by or on behalf of His Majesty's Government or by the Minister of Communications or the Director-General of the Post and Telegraph Department, may be served by sending the same in a letter addressed to the licensee at the office for the time being of the licensee, or by delivery to the master of the ship upon which the licensed apparatus is installed and any notice to be given by the licensee under these presents may be served by sending the same in registered letter addressed to the Minister of Communications.

Signed and delivered by.....

Minister of Communications.

SCHEDULE II.

CONDITIONS AND FORMS FOR THE GRANTING OF CERTIFICATES OF COMPETENCY.

(1) Certificates of competency as to radiotelegraph operators on board merchant ships under the Siamese Flag, shall be granted by the Minister of Communications, subject to an examination and shall be in accordance with Form B. appended hereto. Such certificates shall indicate the system or systems of radiotelegraphy in which the examination was conducted, and shall certify that the holder :

(a) in the case of first-class certificates is able to send and receive, by sound, messages in plain language in the International Morse Code at a rate of not less than 20 words per minute (five letters being counted as one word); or

(b) in the case of second-class certificates is able to send and receive by sound, messages in plain language in the International Morse Code at a rate of from 12 to 19 words per minute (five letters being counted as one word); and

(c) is able to adjust the apparatus ordinarily used in some well-known system of radiotelegraphy so as to suit the varying conditions of working without using excessive transmitting power; and

(d) has an efficient working knowledge of the regulations applicable to the exchange of the radiotelegraphic traffic.

(2) Candidates for examination shall fill up an application according to Form A attached hereto, and submit the same to the Minister of Communications at Bangkok.

(3) Upon being notified that he has successfully passed the examination each candidate shall supply two photographs of himself, one of which will be attached to the certificate of competency, and the other to the duplicate of the certificate which is retained by the Minister of Communications. These photographs will be signed by the candidates and stamped by the issuing officers in such a way as to prevent substitution.

(4) A fee of 10 Bahts will be charged for each examination and an additional fee of 10 Bahts for the certificate issued to a successful applicant.

(5) Each certificate shall be good for five years and may be renewed at the expiration of that period for a like period of five years. Such renewal may be without re-examination if the applicant has been engaged in the actual transmission and receipt of radiotelegrams during at least three of the preceding five years. Otherwise an examination will be required. The fees for renewal examinations and the issuance of renewal certificates are the same as for the original examination and issuance.

(6) If the candidate satisfactorily passes the examination, he shall make a declaration that he will observe the secrecy of radiotelegrams which come to his knowledge in the course of duty.

FORM A.

Application for examination for a..... class certificate of competency as a radiotelegrapher.

1. Name
2. Residence
3. Date and Place of Birth
4. Nationality
5. System of radiotelegraph in which applicant wishes to be examined

The undersigned applicant for examination for a certificate of competency as a radiotelegrapher agrees that, if successful, he will observe all requirements, so far as they may apply to him, of the International Radio-Convention of London, July 5th, 1912, the detailed Service Regulations appended thereto, the Radiotelegraph Law, B. E. 2457, the Regulations used in pursuance thereof, and all amendments and modifications of any of these, which may be issued from time to time.

(Signature).....

FORM B.

... CLASS CERTIFICATE OF COMPETENCY.

Whereas,.....having been examined as to his competency as a radiotelegrapher, according to the Regulations in such case made and provided and said examination having been successfully passed.

It is hereby certified that.....is able to send and receive by sound messages in plain language in the International Morse Code at the rate of.....words per minute (five letters being counted as one word) and is able to adjust the apparatus ordinarily used in the.....system of radiotelegraphy so as to suit varying conditions of working, without using excessive transmitting power and has an efficient working knowledge of the regulations applicable to the exchange of radiotelegraphic traffic.

Accordingly this.....class certificate of competency has been issued to the said.....who by accepting it agrees to be bound, so far as they may apply to him, by all provisions of the International Radiotelegraphic Convention of London, July 5th, 1912, the detailed Service Regulations appended thereto, the Radiotelegraph Law B. E. 2457, and the Regulations issued under the authority thereof, and any amendments and modifications of any of these which may be issued from time to time.

Signed and delivered by.....
Minister of Communications.

BACK.

Name

Residence

Date and Place of Birth

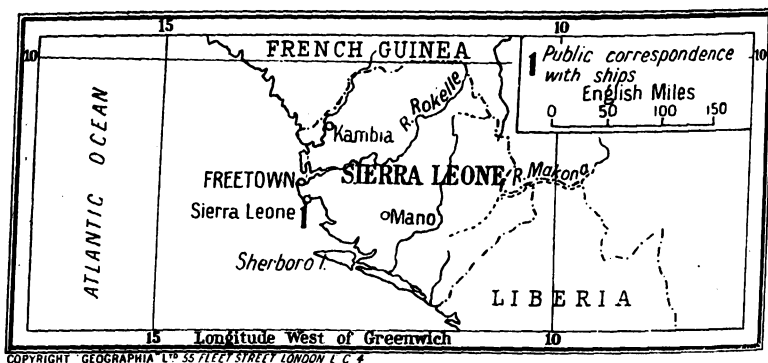
Nationality

I do hereby declare that I will observe the secrecy of radiotelegrams which come to my knowledge in the course of duty.

(Photograph.)

SIBERIA

(See map on p. 389.)



SIERRA LEONE

SIERRA LEONE proper consists of a peninsula about 26 miles long and 12 miles broad covering an area of about 300 square miles. The Colony, however, is much more extensive, stretching from French Guinea on the north to the Republic of Liberia on the east and south-east, its total area being 4,000 square miles.

The capital is Freetown, and the colonial administration is conducted by a Governor and Commander-in-Chief, assisted by Executive and Legislative Councils. The same officials also administer the "Protectorate," a term which applies to the territories, not being portions of the Colony of Sierra Leone, lying between 6° and 10° north latitude and 10° and 14° of west longitude.

CONTROL.

A wireless telegraphy station is installed at Freetown, and is owned and controlled by the African Direct Telegraph Company.

The regulation of wireless telegraphy rests solely in the hands of the Government. There are no wireless clubs or societies.

ADMINISTRATION.

The Sierra Leone wireless laws and regulations were first formulated in the Decree of 1903, and the Schedule founded thereon. In 1912 this Decree and the regulations in the Schedule were amended by Ordinance No. 19 with the Schedule which was thereto attached. In the following year (1913) these were in their turn replaced by Ordinance No. 11 with its accompanying Schedule, both of which we print below. A set of Regulations issued on July 16th, 1917, has been superseded by an additional set issued on May 12th, 1919, which will be found below.

The list of reprints included here covers:—

A—Ordinance No. 11 of 1913.

B—Schedule dated May 23rd, 1913.

C—Regulation No. 1 of 1919.

AN ORDINANCE TO PROVIDE FOR THE REGULATION OF WIRELESS TELEGRAPHY.
No. 11 of 1913.

A Be it enacted by the Governor of the Colony of Sierra Leone, with the advice and consent of the Legislative Council thereof as follows:—

1. *Short Title.*—This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. *Definition of "Wireless Telegraphy."*—In this Ordinance, "Wireless Telegraphy"

means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. *Licence for Wireless Telegraphy.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus

for wireless telegraphy in any place or on board any ship registered in the Colony, except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. *Apparatus aboard ships to be worked in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. *Regulations.*—(1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) *Schedule.*—The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. *Search Warrant.*—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any superior Officer of Police named in the warrant, and a warrant so granted shall authorise the Officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to be used or intended to be used for wireless telegraphy therein.

7. *Penalties.*—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. *Repeal No. 22 of 1903, No. 19 of 1912.*—The Wireless Telegraphy Ordinance, 1903, and the Wireless Telegraphy Amendment Ordinance 1912, are hereby repealed.

SCHEDULE—SECTION 5 (2). REGULATIONS.

B 1. All apparatus for Wireless Telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

- (a) Naval signalling, or
- (b) the working of any wireless telegraph

station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations, "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Passed in the Legislative Council this twenty-third day of May in the year of our Lord, one thousand nine hundred and thirteen.

REGULATIONS (No. 1 of 1919) MADE UNDER SUB-SECTION (1) OF SECTION 5 OF THE WIRELESS TELEGRAPHY ORDINANCE, 1913 (No. 11 of 1913).

C Whereas by sub-section (1) of section 5 of the Wireless Telegraphy Ordinance, 1913 (No. 11 of 1913), it is provided that the Governor may from time to time make regulations for carrying into effect the purposes of the Ordinance:

And whereas by sub-section (2) of section 5 it is provided that the regulations made and passed by the Legislative Council, 23rd day of May, 1913, shall have effect except in so far as they shall be amended or rescinded by regulations made under the authority of the section:

And whereas by regulations made the 16th day of July, 1917, certain of the above recited regulations were rescinded and other regulations were substituted therefor:

And whereas I am minded to make other provision in lieu of the last above recited regulations:

Now, therefore, under and by virtue of the power and authority in that behalf vested in me it is ordered that the regulations made the 16th day of July, 1917, are hereby rescinded and the following substituted therefor:—

1. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

2. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Made this 12th day of May, 1919.

SOLOMON ISLANDS

(See map on p. 356.)

SOUTH AFRICA (UNION OF)

THE Union of South Africa lies between 22° and $34^{\circ} 50'$ south latitude and $16^{\circ} 30'$ and $32^{\circ} 40'$ east longitude. Its total superficial area, not including the Protectorates of Bechuanaland, Basutoland, and Swaziland, which are included within the same geographical boundaries, but do not form part of the Union, is 473,075 square miles. The coast line extends from the mouth of the Orange River on the west coast to a point in latitude south $26^{\circ} 30'$ on the east coast, and measures about 1,725 miles. The greatest distance east to west is a little under 900 miles, and north to south a little over 1,800 miles. At the last complete census, taken in 1911, the population was 1,276,242 Europeans, 4,019,006 natives, and 678,146 other coloured races. On May 5th, 1918, a census of the European population was taken. The preliminary unaudited result of the census shows that there were 730,179 males and 694,511 females, exclusive of persons absent on active service or work in connection with the war. The Union was constituted on May 31st, 1910, under the South Africa Act of 1909, and embraces the former separate self-governing colonies of the Cape of Good Hope, the Transvaal, the Orange Free State, and Natal.

The Executive Government is vested in a Governor-General appointed by the Crown, aided by an Executive Council of Union Ministers, with two Houses of Legislature.

CONTROL.

The administration of radiotelegraphy is in the hands of the Postmaster-General. It is directed by the Engineer-in-Chief of Posts and Telegraphs, and is not treated as a separate unit.

For Colonies working under the direction of the High Commissioner of South Africa (e.g., Basutoland, etc.)—see under their own names.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. H. W. S. Twycross	Postmaster-General	Pretoria
Major E. A. Sturman, C.B.E.	Secretary to the General Post Office	Pretoria
Lt.-Col. N. Harrison, C.M.G., D.S.O., M.I.E.E.	Engineer-in-Chief	Pretoria
Mr. J. H. Weaver, C.B.E.	General Traffic Superintendent of Telegraphs	Pretoria

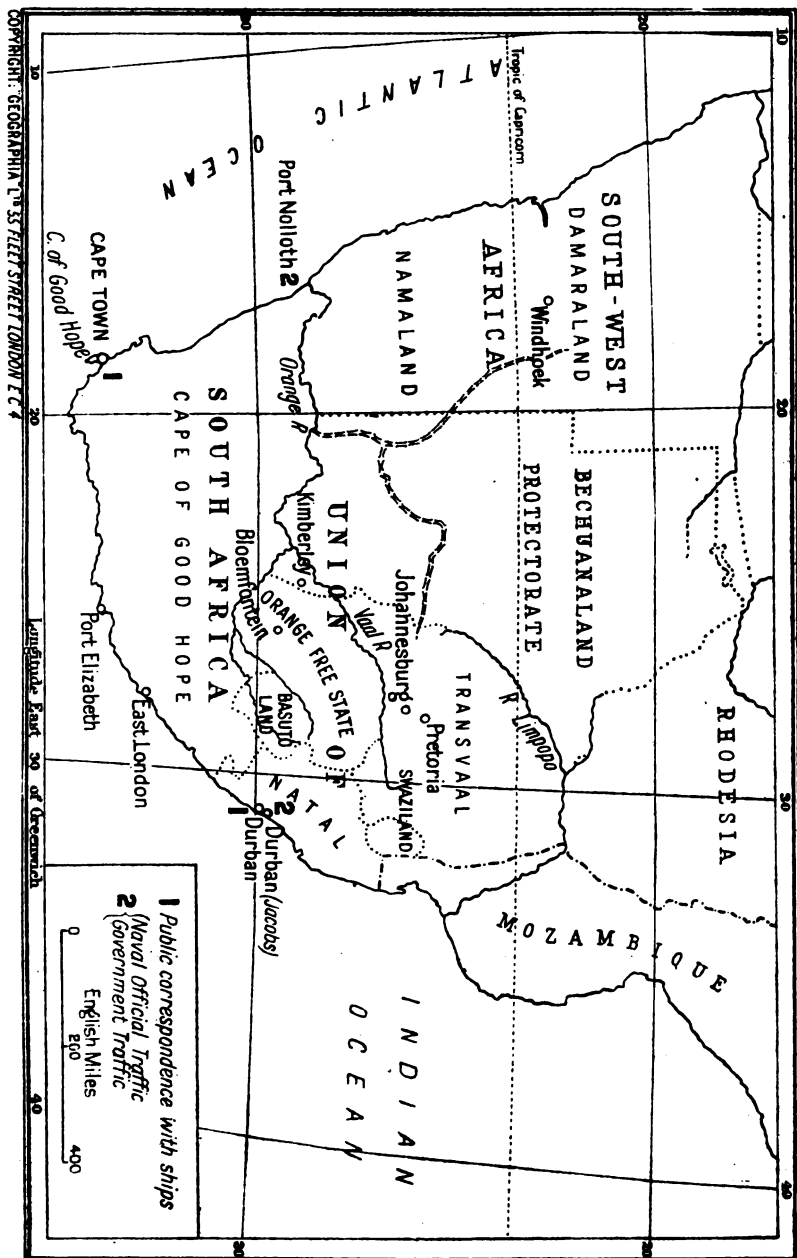
ORGANISATION.

There are four wireless stations in South Africa, under the control of the Union Government. The first was established at Durban in June, 1910, and another at Slangkop, near Cape Town, in May, 1911. In September, 1913, it became necessary in connection with the port defences to remove the Durban station from the position where it had been originally erected to a point some four miles distant. The change of situation has not adversely affected its efficiency.

There are no privately owned stations, and in regard to licensing of private experimental wireless stations the matter is still under consideration. It is probable, however, that the Government will decide to put no obstacle in the way of facilities for private scientific research, while every application will be considered on its merits.

The latest available statistics are as follows:—

Land stations for public service to ships	.. 2
Land stations for Government traffic only	.. 2
Ship stations on privately owned vessels	.. 4 (low power)



ADMINISTRATION.

The only statutory regulation on radiotelegraphy within the Union is that contained in the preamble to the Post Office Act, and Section 80 *ibid.*, both of which will be found below.

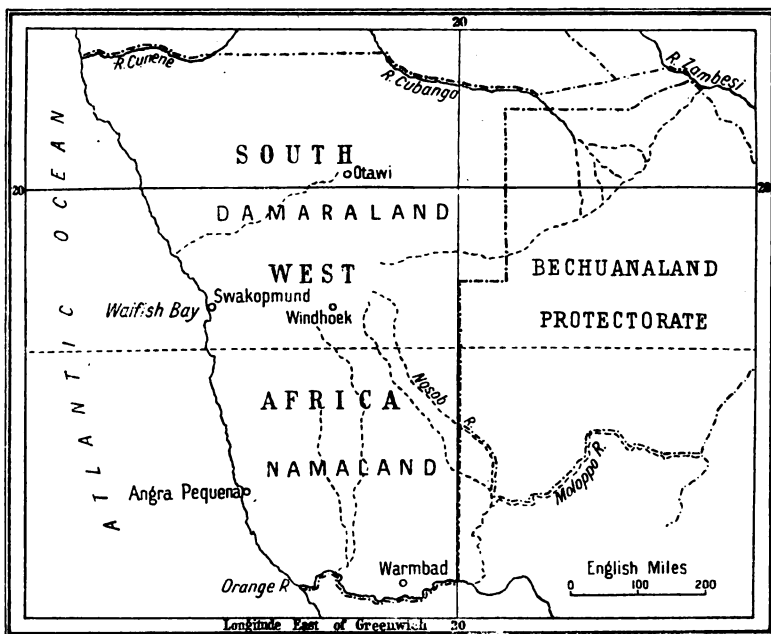
No licences in terms of the section of the P.O. Act of 1911 are being issued under present conditions, and there are no private licensees for radiotelegraphy in existence except four in respect of certain ships. The licence follows the same lines as that issued in Great Britain.

There is no Union Act compelling ships trading in South African waters to be fitted with radiotelegraphic apparatus.

A—Statutory Regulation (Preamble to P.O. Act, 1911).

B—Section 80 of Post Office Act, 1911.

C—Conditions of issue of Amateur Licence.



POST OFFICE ADMINISTRATION AND SHIPPING COMBINATION DISCOURAGEMENT ACT, 1911.

CHAPTER V.—SECTION I.

A In this Act, unless inconsistent with the context, "telegraph" shall include "telephone," and shall mean any system or means of conveying signs, signals, sounds, or communications, by the agency of electricity, magnetism, electro-magnetism, or by any agency of a like nature, whether with or without the aid of wires, and shall include the system commonly known as wireless telegraphy, or ætheric signalling, and any improvements or developments of that system.

"Telegraph line" shall include any apparatus, instrument, pole, mast, standard, wire, pipe, tunnel, pneumatic or other tube, thing, or means whatever, which is or may be used in connection with or for the purpose of sending, transmitting, conveying, or receiving telegraphic signs, signals, sounds, or communications.

1. The Postmaster-General shall have the exclusive privilege of constructing and maintaining telegraph lines and of transmitting telegrams or other communications by telegraph within the Union or the territorial waters thereof and of performing all the incidental services of receiving, collecting, or delivering telegrams or other such communications: Provided that—

(a) the owners of any system of railways may maintain and work for the purposes of any such railway, for the time and to the extent authorised by any law, any telegraph lines constructed in pursuance of rights conferred by that law; and

(b) the Postmaster-General may construct, maintain, or lease telegraph lines for private use or may, by licence, authorise any person to construct, maintain, and work private telegraph lines within the Union or its territorial waters and may prescribe the fees and conditions therefor.

POST OFFICE ADMINISTRATION ACT, 1911.

B 80. (1) The Postmaster-General shall have the exclusive privilege of constructing and maintaining telegraph lines and of transmitting telegrams or other communications by telegraph within the Union or the territorial waters thereof and of performing all the incidental services of receiving, collecting, or delivering telegrams or other such communications: Provided that—

(a) the owners of any system of railways may maintain and work for the purpose of any such railway, for the time and to the extent authorised by any law, any telegraph lines constructed in pursuance of rights conferred by that law; and

(b) the Postmaster-General may construct, maintain or lease telegraph lines for private use or may, by licence, authorise any person to construct, maintain, and work private telegraph lines within the Union or its territorial waters and may prescribe the fees and conditions therefor.

(2) No telegraph line shall be used for the purpose of transmitting or delivering telegrams for the public except by the authority of the Postmaster-General and upon such terms and conditions as he may prescribe, and the department shall have the right, by means of its officers, of inspecting all offices which are authorised to accept, transmit, or deliver public telegrams.

CONDITIONS OF ISSUE OF AMATEUR LICENCE.

PROCEDURE TO BE FOLLOWED.

The applicant should furnish :—

C 1. Evidence of his British nationality and two written references by persons of standing, who are British subjects and not related to the applicant.

2. His full Christian names and particulars of his occupation.

N.B.—If the applicant is a minor, the authority to use wireless apparatus can only be issued in the name of his parent or guardian, who should comply with the requirements and state his (or her) full address and relationship (if any) to the applicant. There is no objection to a minor working the authorised apparatus as the agent of his parent or guardian.

3. A remittance of 10s.

4. A description of the apparatus which it is proposed to instal and, if authority is desired for the use of thermionic valves, a diagram of the circuits in which they would be used.

5. A sketch showing the form, height and dimensions of the proposed aerial (including leading-in wires).

N.B.—Extreme height of aerial above ground roof. Total length of wire including leading-in wires.

100 feet for single wire aerial.

140 feet of wire where two or more wires are used, e.g., total length of 70 feet of double wire.

6. The address at which the apparatus would be installed.

7. Satisfactory evidence that he has in view some definite object of scientific value or general public utility. If scientific research is intended he should be certified as a competent investigator by a Government Department or some recognised scientific body.

8. The name of the person or persons with whose wireless installation it is proposed to communicate, communications beyond a radius of ten miles being forbidden.

9. The installation shall be subject to the approval of the Postmaster-General and to inspection by any of his officers from time to time

SPAIN

THE present Constitution of Spain after having been drawn up by the Government and laid before a *Cortes Constituyentes* elected for its ratification, on March 27th, 1876, was proclaimed on June 30th of that year. It enacts that Spain shall be a Constitutional Monarchy, the Executive vested in the King, and the power to make laws "in the Cortes with the King." The reigning monarch, Alphonso XIII, belongs to the House of Bourbon, which succeeded to the Spanish throne at the end of the seventeenth century. He married Princess Victoria Eugenie, granddaughter of the late Queen Victoria, on May 31st, 1906.

The territory included under the Spanish administration comprises 49 provinces, 47 in the Iberian peninsula and 2 provinces, namely, Canary and Balearic Islands, and as colonies, Fernando Po Island, the Muni coast and Rio de Oro, and Ceuta and Melilla, in Morocco.

The superficial area of the 47 provinces in the Peninsula is 505,207.72 sq. km., the area of the Canaries is 7,272.60 sq. km., and the area of Balearic Islands 514.11 sq. km.

CONTROL.

Radiotelegraphy in Spain is a State monopoly, under the control of the Home Office and the Ministry of War and the Navy. The establishment of a wireless public service was granted on June 26th, 1908, to "La Sociedad

Española Oerlikon," which was responsible for the erection of 24 land stations having three different ranges. The "Sociedad Española Oerlikon" then formed a company "Compañía Concesionaria del servicio público español de Telegrafía sin hilos," which erected the Cadiz, Tenerife, and Las Palmas stations, but did not complete them. The time granted in the contract having elapsed, the concession was then transferred to the actual holders of it, "La Compañía Nacional de Telegrafía sin Hilos," which was formed with the aid, and under the direction of Marconi's Wireless Telegraph Company, Limited, and at the suggestion of the latter, the original plan was altered and reduced to 10 stations, all of greater range.

Licences for erecting and working wireless stations by private companies are not granted, except in the case of teaching or meteorological receiving stations. According to the latest statistics the following stations exist :—

Meteorological observatories	..	..	..	..	4
Official seismological stations	..	..	..	..	4
Educational stations	..	..	..	..	7
Stations open for public service to ships	..	..	..	..	8
Stations open for Government traffic only	..	..	..	..	13
Stations open for private traffic	..	..	..	..	2

There are no *experimental* stations and no *amateur* stations.

There is no special form of licence, and the general conditions subject to which these licences are granted can be found in the addition to Article 6 of the Royal Decree of January 24th, 1908, which Article was modified by Royal Decree of July 19th, 1914.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Excmo. Sr. Don Francisco Bergamín ..	Home Minister	P. Recoletos
Excmo. Sr. Vizconde de Eza ..	War Minister	Génova 13
Excmo. Sr. Don Eduardo Dato Iradier ..	Navy Minister	Alcalá 93
Excmo. Sr. Conde de Colombl ..	Director-General of Posts and Telegraphs	Hotel Paris
Excmo. Sr. Don Tomás Aguilar ..	Sub-Director of Telegraphs ..	—
Sr. Don Pedro Dario del Nero ..	Head of Radio Service	—
Sr. Don Augusto Boyer ..	Second Chief	Alcalá 133

The only company holding permission to work wireless for public service is the "Compañía Nacional de Telegrafía sin hilos."

The companies engaged up to the present in erecting wireless stations are the following: La Compañía Nacional de Telegrafía sin hilos (Marconi system), A.E.G. Thomson-Houston Ibérica (Telefunken), La Compañía Ibérica de Telecomunicación, Centro Electrotécnico (Army Department), and Military engineers (for military purposes).

ORGANISATION.

Radiotelegraphy has from its initiation in practice, attracted much attention and interest in the Iberian Peninsula.

As early as 1899 commissions were appointed in Spain which, from time to time, issued reports to their Government on the subject of Wireless Telegraphy. As a result, a Royal Decree of May 21st, 1905, appointed a permanent commission, presided over by the Chief of the General Staff and including representatives of the War Office, Admiralty and Home Office, thus anticipating the first International Conference concerning Wireless Telegraphy—i.e., the one held in Berlin, 1906 (subsequently modified by the London International Convention of 1912).

Very little was actually done in regard to the erection of wireless tele-

graphic installations before 1906. Trials with unsatisfactory results had been carried out by the Army with field sets, and the Navy with stations on board the *Pelayo*, *Princesa de Asturias*, and *Giralda*. In regard to aviation, it is understood that the Spanish Government is studying a scheme of organisation and rules, although nothing has yet been published.

ADMINISTRATION.

Spain is one of the signatories of the important "Safety of Life at Sea" Convention, and has become a party to all the international agreements affecting radiotelegraphy. She has, moreover, passed separate laws and regulations framed with the object of establishing and developing this applied science in the home country and in her dependencies.

In the course of 1917 an important Royal Order was published by the Ministry of Marine, enacting that every merchant vessel of 500 tons and over must instal wireless telegraphy. The text of this Order will be found below together with the following current Rules and Regulations.

A—Law of October 26th, 1907.

B—General Rules, January 24th, 1908.

C—Regulations, January 24th, 1908.

D—Royal Order of September 4th, 1914.

E—Royal Decree dated February 20th, 1917.

F—Royal Order of June 22nd, 1917.

G—Decree dated October 12th, 1917.

H—Royal Decree of February 8th, 1917.

I—Convention of Madrid, dated June 17th, 1918 (as modified on June 4th, 1919).

J—Royal Decree of January 18th, 1920.

LAW OF OCTOBER 26TH, 1907.

THE GOVERNMENT OF SPAIN IS HEREBY AUTHORISED TO ESTABLISH AND DEVELOP THE WIRELESS, CABLE AND TELEPHONE SERVICES.

A H.M. Don Alfonso XIII, by the grace of God and by the Constitution, makes it known by these presents that Parliament has decreed and he, the King, has given his Royal assent to the following:—

ART. 1.—The Government is hereby authorised to establish and develop the wireless, cable and telephone services—availing itself of the co-operation of national institutions—by means of a Royal Order which will be published within four months from the promulgation of this law.

ART. 2.—The expenses entailed by each service will be covered by the takings of the concession itself. In the case of certain concessions, the proviso is reserved that the establishment may be taken over by the State in whole or part, by Royal Decree, should the so doing be considered as in the national interests.

ART. 3.—Concessions regarding these new services will be granted by public tender, and all necessary conditions must be fulfilled in order to safeguard the interests and security of the nation.

It is therefore decreed:

That all tribunals, magistrates, prefects, governors and all persons in authority, whether civil, military or ecclesiastical, whatever their rank and dignity, must obey and see to it that this law is observed in all its parts.

Given at the Royal Palace on October 26th 1907.

GENERAL RULES.

PROMULGATED BY ROYAL DECREE AS THE BASIS FOR THE ESTABLISHING OF WIRELESS SERVICE IN SPAIN.

B **ART. 1.**—The establishing and exploitation of all systems and apparatus available for the so-called "Hertzian telegraphy," "etherial telegraphy," and "radiotelegraphy," and all similar processes already invented or which may be invented in the future, shall be considered as included among the State monopolies regarding all means of electrical communications.

ART. 2.—The establishing and exploitation of the above telegraphic systems shall be controlled by (1) the Minister of the Interior in all matters appertaining to the general civil applications of the said systems, and (2) by the Ministers of War and Marine when and where those applications are specially connected with national defence and with the army and navy.

ART. 3.—All other official departments requiring a radiotelegraphic service can erect wireless installations by previous agreement with the Minister of the Interior. Such installations will be under the regulations established for the regular wireless service and wireless experiments.

ART. 4.—No experiments with the above-mentioned systems can be instituted in the Peninsula, or in the Balearic and Canary Islands, or in Spain's African possessions, without the authority of the Ministers of War, Marine or Interior, according to the kind of experiment which it may be proposed to carry out. Such experiments and trials shall be carried out under the official inspection of the respective departments responsible, excepting

only those of a technical character carried out by the personnel of the scientific institutions of the State. These shall be independent of the said departments, providing they adhere to the regulations laid down.

ART. 5.—The Minister on whose authority the above installations and experiments are established and effected must give notice thereof to the other Ministers, giving them also full particulars regarding their service and conditions.

ART. 6.—Acting in agreement with the Ministers of War and Marine, in the cases herein aforesaid, and acting independently in all other cases, the Minister of the Interior can authorise the installation of wireless stations, provided that none have been officially installed, when the said installations may have been applied for by individuals, societies, corporations or national institutions, subject to the following rules :—

(1) The applicant shall address himself in the first instance to the Minister of the Interior, stating clearly the place where the installation is to be erected, and supplying a plan of the building, together with the conditions and advantages of the locality.

(2) Such installations and the services they are expected to render shall be subject to the special rules and conditions laid down in each case, and to the general regulations established by the State for its own installations and wireless service.

(3) The Government shall have the right to close the service under extraordinary circumstances affecting the safety of the State and the maintenance of public order.

(4) The Government shall also have the right to acquire by purchase, whenever it may be considered convenient, and with the previous payment of an indemnity, the wireless installations hereinbefore mentioned and the valuation for such compensation shall take into consideration the actual condition of the material and of the installation itself.

(5) The concessionaire shall let the Minister of the Interior know, in good time, the date on which the station or stations will start working, in order to allow the personnel of the telegraph office the necessary time for their inspection.

(6) The petitioner must not consider himself entitled to proceed with the work of installation until the necessary authorisation has been granted.

The following rules were added by Decree of July 19th, 1914.

(7) If the stations are to be fitted up merely for the reception of messages and for scientific purposes, or to serve as auxiliaries to meteorological observatories, authorisation for the same can be obtained from the Minister of the Interior, provided that the application be made by an Official Institution or by a private individual acting with the support of an Official Department.

(8) These receiving stations must be inspected by the Director of Telegraphs of the locality where they are installed.

(9) The persons appointed to carry out the reception must take an oath before the Civil Governor of the Provinces, to keep secret all information they may gather from the radio-telegraphic messages.

ART. 7.—The ships belonging to the national mercantile marine can instal on board wireless stations worked on any of the wireless systems in current use, provided they obtain a special

permit to do so from the Minister of Marine, who will grant it in accordance with the conditions established by the International Agreement and Service Regulations adopted in Berlin on November 3rd, 1906.

ART. 8.—Permits to establish wireless installations will not be granted to any private individual, society, or corporation belonging to a foreign nationality.

ART. 9.—Any person or persons exploiting or using clandestinely any system of wireless, or any person or persons attempting to conduct wireless experiments with apparatus available for the purpose, will be prosecuted in conformity with the Penal Code, the general law, the military orders, or the administrative regulations, as the case may be. Prosecution for these offences will be carried out by the authorities entrusted with the administration of the said laws, orders and regulations; and the State will confiscate all material employed for such purposes.

ART. 10.—By agreement between the Ministers of War, Marine and Interior, the wireless stations which may be considered necessary and convenient for commerce, navigation and national defence will be erected on the seaboard of the Iberian Peninsula, on the Balearic and Canary Islands, and in the African possessions of Spain.

These installations will be under the control of the aforesaid three Ministers, as the case may be, both in the matter of supplies and of personnel and offices, and they will form a part of the national telegraphic system.

This linking up of the wireless with the land telegraphic service will be effected by the ministerial department controlling the various wireless installations.

ART. 11.—Authorisation is hereby given for the interchange of messages between ships belonging to the national mercantile marine and those belonging to foreign nations carrying wireless installations of current systems, and also for the interchange of messages between the said ships and the coast stations already established or to be established by the Ministry of the Interior on the sea board of the Peninsula on the Balearic and Canary Islands, and in the Spanish possessions in Africa.

The Minister of the Interior shall determine the date of the inauguration, the extension and the class of service of each station.

ART. 12.—The Government shall have the option of refusing or accepting those wireless systems the details of which have not been made public.

ART. 13.—The State accepts no responsibility for the wireless service. In the cases of errors or of non-delivery of radiotelegrams the procedure followed will be as established in Art. 35 of the Berlin regulations.

ART. 14.—Whatever the object of the installations, the wireless service shall be organised, whenever possible, in such a way as not to disturb other services of the same kind, or class. The ministerial departments interested shall adopt in each case such rules and regulations as may be found necessary, and shall also arrange regulations with other States regarding frontier installations.

ART. 15.—All wireless services, whether public, official, or private, carried on through the intermediary of land, coast and ship stations, shall be subject to the regulations hereunto attached.

ART. 16.—In addition to the rules herein contained, and those of the regulations mentioned in the previous Article, the provisions affecting Radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, must be observed.

ART. 17.—The Director-General of Posts and Telegraphs shall see to the fulfilment of the stipulations made by Art. 13 of the International Agreement and of those made by Art. 37 of the Berlin Regulations, regarding the International Bureau established in Switzerland. The Ministers of War and Marine shall in accordance thereunto furnish the data required, which must be in the possession of the naval and military installations and stations and also data affecting the merchant ship stations, whose installations are authorised by the Minister of Marine.

ART. 18.—Messages received from or transmitted directly to a country or ship registered in a country which is not a signatory of the convention and regulations of Berlin, can only be admitted through the Spanish telegraphic system and through the coast wireless stations after a declaration has been made by the country in question expressing an intention of applying the rules laid down by the said convention, and their regulations regarding the regular routine of the messages and the security of the accounts. In their radiotelegraphic service the coast stations shall give preference to the service of those countries which have become parties to the international agreements.

Articles 19 to 34 and the additional articles appended thereto deal with wireless installations on fortresses.

REGULATIONS.

GOVERNING THE WORKING OF THE WIRELESS STATIONS IN SPAIN. GENERAL SERVICE.

CART. 1.—All persons are allowed to make use of the wireless service, but the Government reserve to themselves the privilege of suspending for an indefinite period, as they may judge convenient, either every class of communication or such communications as belong to some particular class, or communications which affect some special station or stations.

ART. 2.—The following regulations and conditions laid down for the radiotelegraphic service in Spain, besides the provisions affecting radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, shall be applied to all wireless stations, whether public, official or private, on the coast of the Peninsula, the Balearic and Canary Islands, the African possessions of Spain, and to all ships navigating those territorial waters.

ART. 3.—Ship stations shall be free to select their system of wireless installation; but for coast stations the administration shall adopt the system and equipment judged to be the best available from the point of view of scientific, technical and economic progress.

ART. 4.—All coast wireless stations shall be linked with the general telegraphic system, by means of private lines, in order to secure rapid communications.

ART. 5.—The working of wireless stations of all classes shall be carried out in such a way that, as far as possible, no disturbance may be occasioned to other stations of the same kind.

ORGANISATION OF WIRELESS STATIONS.

ART. 6.—Wireless stations of all kinds must maintain reciprocal communications with the least possible waste of power.

ART. 7.—Wireless stations in Spain shall use the international signals of the Morse Code for the transmission of messages.

ART. 8.—All wireless installations in Spain including both coast and ship stations, open to the public, must carry on an interchange of messages irrespective of their wireless systems.

During the working hours fixed for each coast station the latter must receive the Morse signals and must also have a transmitter so disposed as to be able to reply in the signals of the same code.

ART. 9.—Coast wireless stations must accept and must give *absolute priority* to calls for help from ships in danger. They must, moreover, answer the said calls in the same order of priority and pass them on as urgent messages to the general telegraphic service.

ART. 10.—The administration shall establish three classes of stations—viz., public, official, and private. Those of the first class must have a radius of 600 kilometres and over, those of the second class one of 400 kilometres (there or thereabout), and those of the third class one of 200 kilometres. Exceptions may be made in accordance with practical experience in working.

ART. 11.—First-class stations shall have three wavelengths at their disposal—namely, one of 300 metres, another of 600 metres, and another which may reach the maximum length, but which must not be less than 1,600 metres. The last two will be used normally. The second and third-class stations shall have two wavelengths—namely, one of 300 metres and one of 600; and those of the second class will use normally the 600 metres wavelength, whilst those of the third class will use one of 300 metres, except in the cases referred to in Art. 14 final paragraph.

Coast stations situated near each other may maintain a special service between each other, provided that the distance between them allows of their doing so; but they must give preference to the Maritime Service. In the latter case, and for communications with national vessels on official matters, coast stations of both classes are allowed to use the special wavelengths to which their installations are adapted or adaptable for these services.

ART. 12.—Ships belonging to the Spanish Merchant Service shall use a normal wavelength of 300 metres, but they can alter this to a maximum of 600 metres.

Only in exceptional cases are vessels of small tonnage allowed to use *normal waves* of less than 300 metres.

ART. 13.—The General Post and Telegraph Office shall publish and keep always up to date a Directory showing the coast and ship wireless stations authorised and open to the public; together with the following information:—

(1) Name and geographical position of the coast station; identification signal in the International Code, and the port of register of the ship fitted with wireless.

(2) Call letters. (These must be all different and must be formed by groups of three letters.)

(3) Normal range.

(4) Wireless system adopted.

(5) The class of receiving apparatus whether automatic or auditive, etc.

(6) Length of waves used by the station. (The normal wave must appear in italics.)

(7) Class of service rendered by the station. This covers such items as general communication, restricted communication (*i.e.*, communication with ships, with steamship companies, with ships fitted with apparatus of the same system, etc.); public long distance communications; communications of a private nature; special communications (*e.g.*, those of an exclusively official character), etc.

(8) Hours of service.

(9) Coast and ship station rates.

The Directory above mentioned shall also include information regarding wireless stations not open to general public service and the existence of which has been made known to the International Bureau by the Spanish Administration.

ART. 14.—Wireless service in coast stations shall be, whenever possible, of a continuous nature, operating both night and day without interruption.

The Post and Telegraph Office shall fix, in each case, the hours of service of those stations where the service is limited.

Coast stations where the service is not of a continuous nature cannot close for the day without having transmitted all radiotelegrams to ships within their sphere of action and without having first received all the radiotelegrams advised by them. This proviso shall also apply in the case of ships signalling their presence before the closing hour of the station.

ART. 15.—Private corporations cannot instal ship stations nor can they work any such station without Governmental authorisation. Permits in these cases will be issued in accordance with the provisions of the Berlin Convention and Regulations, by the Ministry of Marine, and will be communicated by the latter to the General Post and Telegraph Office.

Ship stations duly authorised must fulfil the following conditions:—

First.—The system employed must be a tuned system.

Second.—The speed, both for the reception and transmission of messages, must not under normal circumstances be less than twelve words per minute, allowing five letters to the word.

Third.—The power transmitted to the wireless apparatus must under normal circumstances, not exceed one kilowatt. Nevertheless, greater power can be used if the ship is obliged to communicate over a distance exceeding 300 kilometres from the nearest coast station; or, if by reason of any interference, no communication can be established without increasing the power.

The service of the coast and ship stations shall be attended to by operators having their qualifying certificates issued by the General Post and Telegraph Office. This certificate must state the professional knowledge of the operator in the following matters:—

(a) Equipment of the apparatus.

(b) Auricular transmission and reception at a speed of not less than twenty words per minute.

(c) The knowledge of the regulations regarding interchange of wireless communications.

The qualifying certificate must also state that the Government has notified the operator that it is his duty to treat all communications as confidential.

Steamship companies are allowed to employ their own qualified operators provided they fulfil the conditions hereinbefore mentioned.

THE MAKING-OUT AND PRESENTATION OF MESSAGES.

ART. 16.—For the making-out and presentation of radiotelegrams the provisions of Articles 10, 11 and 33 of the Berlin Conference Regulations, in addition to the rules laid down in the following Articles, shall be observed.

ART. 17.—Radiogram forms must have the words *Radio Service* on the heading.

On the transmission of messages from ship to coast stations no mention will be made of the date and hour of deposit.

On the re-transmission of the telegraph lines the coast stations shall note their own name as that of the station of origin, followed by the name of the ship, and shall register as the hour of transmission the time at which the radio was received by them.

ART. 18.—The instructions for delivery of messages destined for ships at sea must be as complete as possible. The form must be filled up as follows:—

First.—The name of the addressee with additional indications if necessary.

Second.—The ship's name as it appears in the Directory, adding her nationality, and if necessary, as in cases where there are two or more ships of the same name, adding also her identification letters in the International Code.

Third.—The coast station name as it is given in the Directory.

ART. 19.—The following messages will not be admitted:—

(1) Reply-paid messages.

(2) Money orders.

(3) Messages to be paid on delivery.

(4) Messages demanding acknowledgment of reception.

(5) Messages to be forwarded.

(6) Messages at special rates, except those for transmission on the telegraphic section or over-land wires.

(7) Messages marked "urgent" except on the over-land wired service, and then only with the reservation that the provisions of the international telegraphic regulations must be applied.

(8) Messages to be forwarded by post or express.

ART. 20.—The messages may be written in plain language or in code in accordance with the interior regulations for ordinary service and with the international conventions on the matter.

ART. 21.—The officials at the stations can ask the senders of wireless messages to prove their identity.

RATES AND EXECUTIVE REGULATIONS.

ART. 22.—In the counting of words in order to apply the rates the officials must follow the provisions of Articles 18, 19, and 20 of the International Telegraph Service Regulations as revised in London in 1903.

ART. 23.—In conformity with Article 10 of the Berlin International Convention, the total rate for wireless messages shall include:—

(1) The rate applicable to the maritime section, namely,

(a) the rate in force at the coast station.

(b) the rate in force at the ship station.

(2) The rate established for the overland wired service, national or international, calculated in accordance with the general rules.

ART. 24.—The rate applicable to the maritime section is hereby fixed at 0.75 pesetas per word, of which 0.45 belongs to the coast station and 0.30 to the ship station.

With regard to the international service, in the case of messages to and from foreign ships, these rates shall be payable in francs, on the same basis.

The rate applicable to the overland wired service, national or international, shall be calculated and allocated in accordance with the interior regulations and with the international regulations.

The minimum rate applicable to the maritime section of wireless messages is hereby fixed at 7.50 pesetas, which is the wireless rate for a radiogram of ten words.

ART. 25.—The coast station rate will be charged only once, even if the message goes through several coast stations.

ART. 26.—The whole cost of the radiotelegram must be paid by the sender, and at ship stations a tariff indicating this must be displayed.

ART. 27.—For the purposes of book-keeping the coast station must consider itself as addressee with regard to the messages coming from the telegraphic service on their way to ship stations; and the coast station must consider itself as the original office with regard to the messages coming from ship stations for transference to the telegraphic service.

ART. 28.—Coast and ship station rates shall be calculated in accordance with the number of words computed, and in accordance with Article 23 of these Regulations.

ART. 29.—Merchant ships at sea can interchange messages if they find it convenient. The rates to be charged in such cases shall be laid down by the respective owners and shall not be taken into account by the National Administration.

ART. 30.—Ship stations on Spanish vessels shall send to those chartering them, upon their arrival in port, all documents in connection with and referring to all messages exchanged with coast stations. The charterers shall send such documents monthly to the General Post and Telegraph Office, where it will be kept for a minimum period of twelve months and where liquidation of the accounts must be made in due course.

ART. 31.—The installations on Spanish men-of-war shall use, in their communications with the coast stations open to the public, the wavelengths which—under the terms of the Berlin Regulations—may be agreed upon between the Minister of Marine and the Minister of the Interior for the official service.

Both Spanish and foreign men-of-war can exchange private messages with the coast stations or with merchant ships; but only for the benefit of their crews. In such cases the technical and tariff provisions of these Regulations and those of the Berlin Convention and the Berlin International Regulations for the

transmission of public correspondence, must be observed, as in the case of a merchant ship station open to the public. The regulations established to prevent the disturbance of wireless communications must be most carefully adhered to.

ART. 32.—When men-of-war exchange messages (private) with coast stations or with other ship installations they must follow the rules established for the computation of words and the collection of rates. In such cases the ship's purser in the Spanish vessels and the Minister of Marine shall respectively exercise similar functions to those assigned to the administration on board, and to the owner, as far as merchant ships are concerned.

In the calculation of coast and ship station rates for private service exchanged with foreign men-of-war, the General Post and Telegraph Office shall come to an understanding with the Administration of the country to which the said men-of-war belong.

ART. 33.—The same provisions shall hold good in the case of a military wireless installation, either permanent or portable, when the said installation utilises the stations established by the Administration for Public Service.

ART. 34.—Should, by some accident, the Submarine Cable Service be substituted for the Wireless Service for the sending of a message, the former shall only receive the rate applicable to a coast station. If communication by wireless is established between two points in Spanish territory otherwise without telegraphic communication, the rates charged shall be those of the Interior Telegraphic Service, and the rules of that service shall apply, except in the cases provided for in Article 19 of these Regulations.

ART. 35.—In the matter of transmission of messages, of the signals to be employed in them, orders of transmission, calls, acknowledgments of receipt, instructions as to the route to be followed by the radiograms, and instruction as to their final destination, the provisions made in Articles 15 to 32, both inclusive, of the Berlin Regulations must be observed.

ART. 36.—In cases when the return of charges made for radiotelegrams has been justly established the provisions of Article 35 of the Berlin Regulations must be observed.

BOOK-KEEPING.

In matters referring to book-keeping for the international wireless service the provisions of Article 36 of the Berlin Regulations must be observed.

GENERAL RULES.

ART. 38.—Coast stations, previously authorised by the General Post and Telegraph Office, shall furnish the authorised agents of Maritime Information Bureau with all such particulars concerning wrecks and disasters at sea as are of any interest to navigators, always provided that the said agents apply for such information.

ART. 39.—Authorised interchange of messages between ship stations on the high seas must be carried out in such a way as not to disturb the coast station's service. The latter shall have, as a general rule, the right of priority for Public Service.

ART. 40.—The order of transmission between ship stations on the high seas shall be settled by agreement between themselves.

The re-transmission of messages between ships at sea shall be arranged by agreement between the interested parties.

ART. 41.—The provisions of the International Telegraphic Regulations shall be applied by analogy, to radiotelegraphic communication as far as they are not antagonistic to these Regulations, or the Convention, Additional Agreement, and the International Regulations of the Berlin Conference.

ART. 42.—The provisions of Articles 5, 6 and 9 of these Regulations shall apply to all classes of wireless installations, official and authorised, even if they are not open to Public Service.

Madrid, January 24th, 1908.

Approved by His Majesty the King
—Maura.

(Seal.)

ROYAL ORDER OF SEPTEMBER 4TH, 1914.

ART. 1.—According to the Royal Order of January 25th, 1908, the inspection and regulation of the Wireless Telegraph Service on board vessels of the Mercantile Marine are under the supervision of the Minister of the Navy, and by delegation to the Director-General of Fisheries and Merchant Shipping. The installations should fulfil all the requirements of the said Royal Order together with the rules and regulations of the London Radiotelegraph Convention of June, 1913, and the Rules of the Safety of Life at Sea Convention, January, 1914.

Everything affecting the service shall be controlled by the Navigation Department, which shall attend to the following matters:—
(1) The registration of all new installations authorised.

(2) The forwarding of all documents regarding such new installations accompanied by the order for their recognition.

(3) The sending of a report to the Home Office and War Office as to the result obtained from the various installations, together with indications of their characteristics.

To attend to this service the Director of Navigation and Fisheries will nominate a chief or a superintending official, together with five wireless inspectors on the coast, and this staff must have the qualifications as set forth in the Royal Order of May 21st last.

ART. 2.—The distribution of the staff on the coast and in the maritime provinces under each inspector shall be as follows:—

Barcelona.—Maritime provinces of Barcelona, Tarragona, Valencia, Mallorca, and Minorca (the residence of the inspector being at Barcelona).

Cartagena.—Maritime provinces of Alicante, Cartagena, Almería, and Málaga, Melilla and Ceuta (the residence of the inspector being at Cartagena).

Cádiz.—Maritime provinces of Cadiz, Canary Islands and Huelva (the residence of the inspector being at Cadiz).

Vigo.—Maritime provinces of Vigo, Pontevedra, Villagarcía and Coruña (the residence of the inspector being at Vigo).

Bilbao.—Maritime provinces of Gijón, Santander, Bilbao and S. Sebastián (the residence of the inspector being at Bilbao).

ART. 3.—The wireless inspectors shall be under the orders of the Commandante de Marina of districts to which they are attached and in the ports of which they will have to make their annual inspection. They will only

be allowed to leave their habitual place of residence when, for the convenience of the shipbuilders, they have to inspect a station in any other part of their district.

ART. 4.—The wireless inspectors must attend to the following duties:—

(a) To verify and inspect all new installations concerning which they may have been notified by the Director-General of Navigation and Fisheries that they are ready for public service, and to send in a report of the result of their verification and inspection.

(b) To visit annually the installations of such ships as are registered in the ports belonging to the districts within their jurisdiction, and to issue the necessary certificate according to the London Safety of Life at Sea Convention.

(c) To inspect foreign ship stations on board vessels which take passengers in Spain with the object of verifying that they are in possession of the certificate issued under the Safety of Life at Sea, which certificate must have been issued by the maritime authorities of their respective countries.

(d) To report to the Director-General all remarks or complaints made by the ship-owners, crew or passengers in regard to this service so that the aforesaid Director may take such necessary steps as he may think fit.

(e) To see that all the staff that work the installations are in possession of the Government certificate according to the law of January 24th, 1908, with the object of making sure that all these installations are handled by duly qualified operators.

ART. 5.—For these duties a register book will be given to the wireless inspector in which he shall note the following particulars of each visit:—

(a) Date and place of inspection.

(b) Name of the vessel.

(c) System, radius, wavelengths, etc.

(d) Names of operators and dates of their certificates.

A copy of this information is to be sent every quarter to the Director-General in order that he can make out a list and maintain a register devoted to all important information and data.

ART. 6.—The naval and marine authorities will do their best to facilitate the work of the inspector, putting at his disposal the *craft* and *personnel* required by him for the fulfilment of his duties.

ART. 7.—When it is desired to instal a wireless station on board a ship, the builder, the owner, the agent or the captain must ask for permission from the Director-General of Navigation and Fisheries. As soon as the installation is completed the applicant must notify the above authority, stating the port in which he desires the visit to be made, so that the wireless inspector may receive instructions accordingly.

ART. 8.—Wireless installations are subdivided into three classes:—

(1) Stations with permanent service.

(2) Stations with limited service.

(3) Stations with special service.

Class 1 includes all vessels which carry twenty-five or more passengers and which have an average speed of fifteen or more knots. This class includes also ships carrying 200 or more passengers, having a speed of over thirteen knots, and travelling a distance of over 500 miles between two consecutive ports. The

latter vessels should carry at least two telegraphists.

To Class 2 belong all the steamers not included in Class 1, provided they are fitted to carry twenty-five passengers or more. During the voyage the ships of this class must have one telegraphist on constant watch during seven hours per day and ten minutes at the beginning of the other hours.

In cases where the vessel is more than 500 miles distant from the nearest coast, the watch must be permanent.

To Class 3 belong all ships which are not included in Classes 1 and 2, and having fifty or more persons on board and carrying less than twenty-five persons or none.

The watch service on these ships must be continuously maintained during a transatlantic voyage or when the ship is over 1,000 miles distant from the coast. In special circumstances, and whenever advisable for the safety of life at sea, ships of every class may be obliged to keep a constant watch.

Vessels belonging to subsidised Government lines are obliged to carry wireless no matter where they sail or what crew they carry.

ART. 9.—The radius of the wireless station shall be a minimum of 100 miles at sea in day-time when communicating with ships under normal conditions and circumstances.

All the stations must be provided with an emergency set, installed on the upper deck, which must be kept in the best condition, having a source independent of the main electric supply and capable of being set in instant working order; this set must be able to work during six hours at least, and must possess a radius of a minimum of eighty miles for ships of the first class and fifty miles for the others.

ART. 10.—When testing the transmission and reception of messages, both installations shall be made to work with a ship at a distance of about 100 miles.

The wavelength and the oscillation current of the aërials must be measured.

When the Director-General thinks it necessary, the curves of resonance will have to be made and the degrees of coupling adjusted. When it is necessary to test the state of the receiving apparatus, the Director may order that one or several of the officers in that service shall mark trial tests with the different stations at various distances during the voyage.

ART. 11.—Inspections must be made at the ports of Barcelona, Cartagena, Cadiz, Vigo and Bilbao, which are the places of residence of the wireless inspectors. However, if for the convenience of builders, the inspection should be carried out at some other port, these builders must defray the travelling expenses of the said inspector.

ART. 12.—The radio inspectors shall receive remuneration for all the inspections they carry out with regard to wireless installations.

The amount of this remuneration shall be 100 pesetas with an increase of twenty-five pesetas for each auxiliary transmitter which the ship may carry independent of the emergency installation. Such remuneration shall be the same whatever the rank held by the radio inspector.

The annual inspections held for the issue of certificates in accordance with the provisions of the London Safety of Life at Sea Convention shall be made free of charge.

(Signed) RAMON ESTRADA,
Director-General of Navigation and
Marine Fisheries.

Madrid, September 4th, 1914.

ROYAL DECREE DATED FEBRUARY 20TH, 1917.

Inscribed in the Official Record Under No. 49.

E His Majesty the King (whom God save) inspired by the sentiment of humanity, of which the crews of the merchant ships, which in these difficult times with bravery and with risk to their lives maintain our maritime commerce are deserving, has, in accordance with the proposal of the Director-General of Navigation and Sea Fisheries, designed to decree—

1. All merchant ships of 500 tons and upwards which make long sea voyages or long coasting voyages must carry a wireless installation having a minimum range of 100 miles, as laid down under the International Radio-telegraphic Convention.

2. Similarly the said ships will carry one or more lifeboats in proportion to the number of the crew, each fitted with its own motor, or provided with adjustable motors of such a kind as to answer the same purpose.

3. Local directors of navigation shall allow a certain time for each ship to be provided with these things, the shipowners having to certify before the said authorities that they have taken the necessary steps or made definite contracts to obtain them.

ROYAL DECREE DATED JUNE 22ND, 1917.

F In view of the request made by the "Cia Nacional de Telegrafia sin Hilos," His Majesty the King (whom God guard) has been pleased to order that all the radiotelegraphic stations concerned in the Royal Decree of Feb. 20th last inscribed in the Official Record under No. 49 shall carry emergency installations in accordance with Article 9 of the regulations for the service of installation and inspection of radiotelegraphy on board merchant ships on September 4th, 1914, excepting those installations which have sources of energy independent of that which forms a regular part of the ship's equipment and is fitted on deck.

Madrid, June 22nd, 1917.

ROYAL DECREE DATED OCTOBER 12TH, 1917.

Issued in the form of a Circular Published in the Official Gazette of the Spanish Ministry of Marine No. 235 of November 19th, 1917.

G In view of the collection of information by this Administration for the fulfilment of the Royal Orders of February 20th, and June 16th last (inserted in the Official Gazette of this Ministry and numbered 29 and 143 respectively) relative to the complete installation of wireless telegraphs on board merchant vessels of 500 tons and upwards, which are engaged in overseas and extended coasting trade, with a minimum range of 100 miles, on the conditions notified in the regulations governing wireless telegraphy.

And in view of the data recently communicated by the companies "A. E. G. Thomson Houston Iberica" and "Nacional de Telegrafia sin Hilos," the former saying that its resources permit the construction of 25 stations per month and that within one year 300 can be provided, whilst the latter give an assurance that they are able to supply wireless stations with the least possible delay, but not defining the duration of this delay.

It resulting from previous communications from this department that there are 57 stations already fitted and arranged for, and that there remain some 80 to be constructed or fitted.

It resulting, moreover, that this Administration deems a delay of eight months to be sufficient for the "Compañia Nacional de Telegrafia sin Hilos" to supply these 80 stations, that company being looked upon as a firm reputed in the business world as of good standing and with resources fully equal to those of the "A. E. G. Thomson Houston Iberica" and the delay of eight months being the double of that within which the latter undertake to fulfil those engagements.

His Majesty the King (whom God guard) in conformity with the information supplied by the Administration, and in agreement with his Privy Council, has thought it well to dispose that, beyond a delay of eight months from the date of publication of this Royal Order, the sailings of the ships mentioned in his Decree of February 20th of the present year shall be stopped if they fail to be fitted with complete wireless stations in accordance with the existing regulations, and that the Marine authorities in the provinces shall carefully communicate this decision to those who appear in their books as proprietors of the respective ships.

ROYAL DECREE OF FEBRUARY 8TH, 1917.

HART. 1.—All civil private wireless stations, whether they be transmitting and receiving stations, receiving alone, or assigned for the use of scientific or auxiliary meteorological observatories, are subject to the inspection of the Government, such inspection being carried out by the Home Office and the General Direction of Posts and Telegraphs.

The inspection shall be carried out by telegraph officials, and its object is to promote public order and interest, and protect the rights of the communication monopoly that belong to the State, in fulfilment of the present dispositions on the matter and in strict observance of the concession conditions.

In accordance with the rights granted by contract with the State to the "Compañia Nacional de Telegrafia sin Hilos," this company can also perform the inspection of the above-mentioned wireless stations at her own expense.

The appointment of inspectors by the company shall be countersigned by the Postmaster-General, and when in performance of their duty will be treated as public officials and be granted the same facilities in the exercise of their duties as those given to the Government inspectors stated in Arts. 3 and 4 of this Royal Decree.

The Home Office shall decide all questions which might arise in the carrying out of this private inspection.

ART. 2.—In addition to the inspection work which the Home Office or the Postmaster-General may at any moment judge convenient to carry out a constant inspection service shall be carried out in the said civil radiotelegraphic stations under the Spanish State authorities.

ART. 3.—To carry out the constant inspection service stated in the preceding article, an inspector for each station shall be appointed by the Postmaster-General, who shall superintend the work, and the station shall not be used even for scientific purposes, except under his

personal supervision. The inspector shall adopt such measures as he thinks fit to prevent the station being used during his absence.

When the working of a station cannot be attended to by one official alone, the Postmaster-General may assign two or more inspectors, and distribute between them the work of the station as he may judge convenient.

ART. 4.—Access will be allowed to the inspector of the station at any time of the day or of the night without need of permission, request, or notice of any kind.

For this purpose the keys of the place or places in which the apparatus is installed shall be given to the inspector by the owner or licensee of the station, so that no obstacle or delay may prevent his entrance.

ART. 5.—A weekly report of the general working condition of the station, stating the nature of the service, the day, hour, and minutes when they were effected, and any observation the inspector may judge should be specially noted, should be sent by him to the Telegraph Direction.

Immediate notice shall also be given by the inspector to the General Telegraph Direction of any technical or legal anomaly observed in the working of the station, and the orders of the authority shall be transmitted, executed, or caused to be executed by the said inspector.

ART. 6.—All applications for licence to instal a radiotelegraphic station must comply with the following conditions, as well as with all others in force at the time:—

(1) The purpose for which the station is to be employed must be clearly expressed.

(2) A plan of the site where the station is to be installed, its communication with the public street or road, and the places where the apparatus are to be mounted in a 2 per cent. scale, and another plan with diagram of connections and details of aerial in a 10 per cent. scale, shall accompany the request for the licence.

(3) A detailed list of the apparatus specifying their nature, trade mark, and manufacture number (if any), must accompany the application.

(4) The name, age, address, and professional title (if in possession of one) of the operator or operators who will work the station must be stated.

The Home Office Minister can grant or refuse the concession of the licence, and can also modify the technical conditions of the installation before or after the licence has been granted.

ART. 7.—No modification either of the installation or disposition of the station is allowed without authorisation of the Home Office Minister acting on information of the appropriate inspector.

All modifications should be reported to the General Telegraph Direction by the inspector of the station.

ART. 8.—Before a station is opened the proprietor or licensee will deposit a sum of 5,000 pesetas in the general safe of deposits at the disposal of the Postmaster-General, and set aside to cover the pecuniary obligations which the proprietor or licensee might incur.

This sum must be replaced should it diminish or disappear in making good the obligations for which it is set aside.

ART. 9.—The proprietor or licensee must pay all expenses incurred by the final inspection. These expenses comprise a sum which will be

fixed by the Postmaster-General, and which must not exceed 2,000 pesetas per annum, to be given to the inspector in monthly payments as a reward for his services, and in payment of all office expenses.

Office accommodation should also be provided for the inspector of the "Compañía Nacional de Telegrafía sin Hilos," should there be one.

Should there be no telegraph office in the place where the station is installed, the proprietor or licensee must provide decent food and lodging for both the official and private inspectors, should there be any.

ART. 10.—The General Direction will classify as major or minor offences any infringements by the proprietor or licensee or any of their staff of this Royal Decree or any other standing orders in this regard.

In all cases the following will be considered as a major offence:—

(1) Not fulfilling the conditions of the licence.

(2) Any modification in the installation or arrangement of the station without due authorisation of the Home Office.

(3) Deliberate obstruction of the inspector with regard to free access to the station under his charge.

(4) The using of the station for any service without the presence of the inspector.

(5) Infringement of the terms of Art. 8 of the Royal Decree.

ART. 11.—Apart from other criminal or civil responsibilities involved in the offences enumerated in the preceding article, the following penalties will be exacted:—

(a) Fine of 100 to 500 pesetas for petty offences.

(b) Fine of 501 to 2,000 pesetas for serious offences, together with loss of the licence and apparatus. The station will be dismantled at the General Direction of Telegraph's will.

The working of the station may be immediately suspended by the inspector on his discovery of any of the offences enumerated in numbers 1, 2, 3 and 4 of the preceding articles.

ART. 12.—Apart from other criminal responsibilities binding upon the inspector, acts of commission or omission infringing this Royal Decree or any other standing regulations on the matter will be considered as serious offences, and will be punished in accordance with the rules and regulations of the Post and Telegraph Corporation. Should the inspector not belong to the said corporation (*i.e.*, hold the rank of private inspector), the offence will be punished with the fine of 100 to 2,000 pesetas and disability from continuing in his office, the "Compañía Nacional de Telegrafía sin Hilos" being responsible for the payment of the fine.

ART. 13.—Any illicit station discovered shall be immediately dismantled, the General Direction taking possession of all apparatus. The proprietor and any other persons who may be found guilty of installing or working such a station shall, apart from other criminal responsibilities to which they be liable, be punished with a fine of 2,000 to 5,000 pesetas.

The owner of the building, director of the establishment, society, or corporation in

whose premises a clandestine station is installed, and who, as soon as it comes to his knowledge, does not report the fact immediately in the quickest possible way to the General Direction, will incur the same responsibilities.

ART. 14.—Trial for these offences shall be held in public.

An informer shall be entitled to half of the amount of the imposed fine.

ART. 15.—The use of radiotelegraphy granted to official centres for scientific purposes and worked by public officials is not subject to constant inspection, and is excused the deposit referred to in Article 8. The service will not be suspended, nor the apparatus confiscated, should any infringement be committed by the licensee or staff; but the persons guilty of the offence shall be subject to the criminal or civil responsibilities which may personally affect them. A report will be sent in by the Minister of the Home Office to the Minister under whose supervision the station is administered of the offences committed in order to assure the observance of this Royal Decree, and that these offences should be noted in the personal service records.

ART. 16.—The terms of the Royal Decree do not concern the "Compañía Nacional de Telegrafía sin Hilos" (except those which specifically affect this company), and the inspection of these stations will be subject to the conditions of the contract with the State.

ART. 17.—The authorisation for the working of radiotelegraphic stations granted with priority under the Royal Decree must be carried into effect. The General Direction of Telegraphs will immediately organise the constant inspection service for the stations not comprised in Articles 15 and 16.

A term of eight days is granted from the date of publication of this Royal Decree for all private authorised existent stations to send in to the General Direction the information referred to in numbers 2, 3, and 4 of Article 6, and also make the deposit ordered in Article 9. If the term expires before the fulfilment of these obligations, the station will be considered as illicit, and immediate proceedings taken under Article 13, unless the licensee shall present before the expiration of the fixed term a renunciation of his licence to the Minister of the Home Office through the General Direction. He must as a preliminary thereto have dismantled the apparatus.

The same term of eight days is given to those in charge of existing radiotelegraphic stations to hand over to the General Direction the information asked for in numbers 2, 3, and 4 of Article 6. Should the term expire without the fulfilment of these conditions proceedings will be taken according to Article 15.

CONVENTION OF MADRID, DATED JUNE 17TH, 1918, AS MODIFIED BY CONFERENCE OF JUNE 4TH, 1919, CONCERNING WAVELENGTHS TO BE USED BY STATIONS UNDER SPANISH CONTROL.

I. The undersigned have held meetings of a semi-official character in the Ministry of State, Madrid, Spain, on June 12th, 13th, 14th and 15th, 1918, for the purpose of discussing the means for avoiding interference in communications by wireless

telegraphy and for the establishment of a programme which shall benefit mutually the radiotelegraph services of the various Governments represented.

2. Attached and below are three annexes marked (A), (B) and (C), in which are contained the agreements unanimously arrived at by all the representatives present.

Annexe (A) sets forth the agreements adopted.

Annexe (B) contains the organisation proposed in the transmission and reception by wireless telegraphy of the stations of the Spanish Army and Navy.

Annexe (C) includes the organisation proposed in the transmission and reception by the stations of the Compañía Nacional de Telegrafía sin Hilos and of the Ministry of State.

3. It is understood that all the agreements and arrangements are subject to the approval of the various Governments represented.

Major R.M.L.I.
English Representative.

Naval Lieutenant,
French Representative.

Lieutenant (jg) N.N.V.
Representative of the United States.

Corvette Captain,
Representative of the Ministry of Marine.

Commander of Engineers and of the Army,
Representative of the Ministry for War.

Naval Lieutenant,
Representative of the Department of the Interior and of State.

(For Annexe (A) see next page.)

TABLE B AS MODIFIED BY CONFERENCE OF JUNE 4TH, 1919.

Call Signs.	Name of Station.	Watching Wave. (Note 1)	Normal Transmitting Wave. (Note 2)	Other Waves used only in case of Interference. (Note 3)	General Watching Wave during (Note 1)	
					First Five minutes of the hour.	Last Ten minutes of the hour.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			MILITARY.			
EGA	Almería ..	900	900	1200.1590.2100	600	—
EGB	Melilla ..	900	900	1200.1590.2100	600	1590†
EGC	Madrid ..	1500	2100	1500.2500.3750	—	—
EGD	Ceuta ..	1500	1590	900.1200.2100	600	1590†
EGE	Barcelona ..	900	900	1200.1590	600	1590†
EGF	Larrache ..	1200	1200	900.1590.2100	600	1590†
EGG	Valencia ..	900	900	1200.1590	600	1590†
EGH	Bilbao ..	900	900	1200.1590	600	1590†
EGI	Mahon ..	900	900	1200.1590	600	1590†
EGJ	Coruña ..	900	900	1200.1590	600	1590†
EGK	Tetuan ..	2100	2100	900.1200.1590	600	—
EGL	Cape Juby ..	900	900	1200.1590	600	—
EGM	Malaga ..	1500	1590	900.1200.2100	600	—
EGN	La Palma ..	900	900	1200.1590	600	—
			NAVAL.			
EBW	Le Ferrol ..	900	900	*1200.1590	600	450
EBX	Cartagena ..	900	1200	*1200.1590	600	450
EBY	San Fernando ..	900	1200	* 900.1500.2100	600	450
EBZ	Madrid ..	—	—	—	—	—
CLZ	La Caraca ..	450	450	—	—	—
—	Large ships ..	900	900	*1200.1590	600	450
—	Small ships ..	900	450	900	600	450

NOTES.—(1) A station is always to be called on his watching wave (columns 3, 6 and 7).

(2) Normally the answer to the call and the signal to transmit should be made on the normal transmitting wave (column 4).

(3) In case of interference only, one of the waves indicated in column 5 may be used temporarily to avoid such interference.

(*) 1590 metre and 2100 metre wavelengths not to be used except when communicating with EGC, EGD, EGF and EGK.

(†) The watch on 1590 metres will not be kept except when ordered.

TABLE C AS MODIFIED BY CONFERENCE OF JUNE 4TH, 1919.

Name of Station.	Call.	Watching Wave.	Transmitting Wave.	Wave to communicate with other Land and Ship Stations.	Remarks.
Aranjuez	EAA	—	3800	—	—
Barcelona	EAB	600	2350	—	—
		(Ship Stations)			
Cadiz	EAC	600	2500	900	Begins Press at 2030 G.M.T.
		(except when working with EAL and EAT)			
Finisterre	EAF	600	600	900	—
Melenara (Las Palmas)	EAL	600	2100	900	Begins Press at 0300 G.M.T.
		(except when working with EAC and EAT)		(with EAT)	
Soller	EAO	600	600	900	—
Cabo de Palos ..	EAP	600	600	900	—
Santander	EAS	600	600	900	—
Tenerife	EAT	600	2100	900	Begins Press at 0230 G.M.T.
		(except when working with EAC and EAL)		(with EAL)	
Vigo	EAV	600	2350	—	Closed temporarily.
Sta. Isabel de Fernando Pó.	EAY	600	600	—	—
Legación de Tánger ..	AB	900	300	—	Calls EAC on 600 and transmits on 300

ANNEXE (A).

AGREEMENTS ADOPTED.

1. The Agreements of the International Radiotelegraph Convention of July 5th, 1912, will be strictly observed.
2. *Always whenever possible*, communication on a wave of 600 metres will be prohibited.
3. In accordance with the Convention, Spanish merchant ships shall continue to use the 600 metre wave when communicating with commercial coast stations and between themselves.
4. Although war vessels are entitled to use any length of wave whatever, it is agreed for mutual convenience that Spanish war vessels shall not communicate with naval and military stations or between themselves on 600 metres, but with the wavelengths specified in the Annex (B).
5. It is agreed that inter-communication between Spanish coast stations, whether military naval or commercial, shall not be made with a 600 metre wave, but with the wavelengths fixed and specified in the Annexes (B) and (C).
6. When a Spanish military, naval or commercial coast station desires to send a message to a Spanish coast station (commercial) which listens-in on a wave of 600 metres, the call will be with a wave of 600 metres and immediately afterwards they will give each other the conventional signals to change over to the 900 metre wave, and all subsequent communication will take place on that wave.
7. No operator of a coast station or ship station shall listen-in for more than one wavelength during the same period of time.
8. As far as possible, efforts shall be made that Spanish wireless telegraph stations do not interfere with the advices transmitted by coast stations at fixed hours or with the familiar calls for assistance (*llamadas de auxilio*).

The hours at which those advices are transmitted by stations on a wave of 600 metres are at present as follows:—

Station.	Call Signal.	Time (G.M.T.).
Casablanca ..	CNP	0245, 1045, 1845.
Gibraltar ..	BYW	0830, 2030.
Monsanto ..	CTV	0145, 0945, 1345, 2145.
Orán ..	FUO	0030, 1400.
Toulon ..	FUT	0930, 2040.

Wavelengths longer than 600 metres, on which the aforementioned advices are transmitted, are not used in the Spanish organisation given in the Annexes (B) and (C).

9. As far as practicable, the wavelengths which have been adopted by all the nations for their press messages will be respected and not interfered with.

No press message shall be transmitted with a 600 metre wave.

10. With the object of obviating interference by the North American, English and French stations with the Spanish stations, the wavelengths selected in the Annexes (B) and (C) will not be changed as far as possible.

11. No call signal or any other working signal shall be made more than three times in each call, and no call signal shall be repeated more than three times in a quarter of an hour. (International Radiotelegraph Convention of London, July 5th, 1912, Articles XXV and XXVI.)

12. All nations represented agree to take the necessary steps to obtain the most exact synchronisation possible at all their stations with a view to ensuring the efficiency of the organisation of wavelengths given in the Annexes (B)

and (C), and so that the intermediate wavelengths of 300, 750, 1050, 1350, 1650, 2200, 2750, etc., shall remain free for the use of North American, English and French warships and stations.

13. All communications by wireless telegraphy shall be limited as far as possible.

14. Meetings of a semi-official character will be held in Madrid every six months (June 1st and December 1st) between the representatives of the United States, England, France and Spain, with the object of exchanging impressions regarding :—

- (a) Mutual organisation ;
- (b) Means for eliminating interference ;
- (c) Change of wavelengths ;
- (d) Complaints.

ROYAL DECREE OF
18TH JANUARY, 1920.

On wireless telegraph and telephone installations for scientific purposes.

J Wireless telegraph, or telephone, sending and receiving, or only receiving, installations, for scientific purposes, are divided into two classes, viz. : (1) Permanent installations ; (2) Provisional installations.

Permanent installations, either for research, or as a complement to meteorological observatories, or for any other purpose, will be subjected to the prescriptions of the Royal Decree dated 8th February, 1917.

Provisional installations, or those fitted with the sole object of scientific experimenting or study of any branch of wireless communication, will be permitted by the Home Minister at his discretion for a given time, under the following conditions :—

(1) Applications shall be accompanied by a full report of the experiments and researches which the applicant intends to carry out, showing the place or places destined for these experiments, with diagrams, if possible, of the aerial, transmitting or receiving apparatus and their category and importance.

(2) It must be stated for how long the licence is required in order to carry out experiments and for how many hours per day it is intended to use it.

(3) The installation shall be inspected by an appointed official of the Spanish Telegraphs, and always under the control of the local Chief of the Telegraphs.

(4) As every licence will be issued for a fixed time, at the expiration thereof the installation, comprising aerial and apparatus, shall be dismantled and the matter reported to the Director of Posts and Telegraphs.

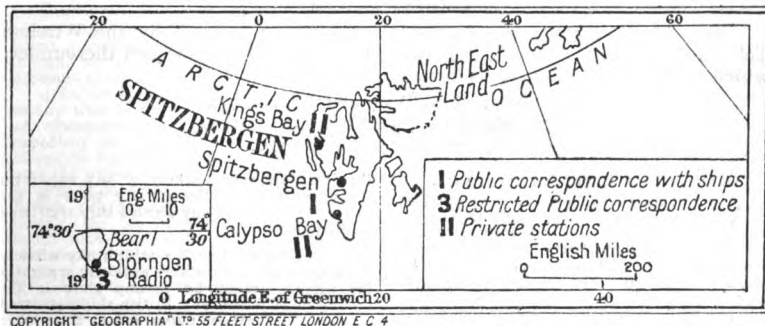
(5) Employing the installation for other than experimental and research purposes will entail a fine upon the licensee of pesetas 500 to 2,000, in addition to the confiscation of apparatus and aerial, which shall become the property of the telegraph authorities.

(6) The licensee shall bear all expenses consequent upon the official inspection of this class of installation, in accordance with the stipulations of the Director of Posts and Telegraphs.

(7) Installations licensed for experiments in transmission shall be operated only at the hours and on the wavelength authorised by the Director of Posts and Telegraphs, in order to prevent interference with official and public services.

SPITZBERGEN

THIS group of barren islands, discovered by Barents in 1596, has formed the starting point for many expeditions in their endeavours to reach the North Pole. They lie in about 80° N. latitude, and between 10° and 30° E. longitude, and possess rich mineral resources. Frequent attempts have been made in recent years to open up the archipelago commercially, and with that object several companies have been formed. One of these



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owns two of the three wireless stations on the islands, situated respectively at King's Bay and Calypso Bay, whilst the third is owned and worked by the Norwegian Government. No laws and regulations yet exist regarding the working of radiotelegraphy, but as the territory has been placed under the suzerainty of Norway their proximate promulgation is to be expected.

On Bear Island, situated about midway between Norway and Spitzbergen a 3 k.w. Marconi Station has been erected. This land station is owned privately by the Bear Island Code Company in Tromsø, and is intended for communication direct with the Government wireless station at Fugoy (Norway).

STRAITS SETTLEMENTS

(See map on p. 139.)

THE Crown Colony of the Straits Settlements comprises Singapore, Penang, and Malacca. These settlements were transferred from the control of the Indian Government to that of the Secretary of State for the Colonies on April 1st, 1867. Labuan, the Cocos Islands and Christmas Island have since been annexed to the Colony.

The administration is vested in the hands of a Governor, aided by an Executive Council, legislation being under the direction of a Legislative Council, presided over by the Governor.

CONTROL AND ORGANISATION.

Commercial wireless telegraph stations have been erected at Paya Lebar, Singapore, opened for traffic on October 8th, 1915, and Penaga, Penang, opened for traffic on February 21st, 1916. These installations are Government land stations under the control of the Postmaster-General.

Wireless telegraphy is a State monopoly, and licences to erect and work stations are not issued to private companies or individuals.

There are no companies engaged in the manufacture of wireless apparatus, and no wireless societies, clubs, or publications. Arrangements have not yet been completed for the installation of aviation stations, and there are no wireless arrangements for the transmission of meteorological signals.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. F. M. Baddeley	Postmaster-General	Singapore
Mr. F. H. Dupree	Engineer Operator	Singapore
Mr. S. R. Drayton	Engineer Operator	Penang

ADMINISTRATION.

The administration of wireless telegraphy is regulated by the Wireless Telegraph Ordinance of 1912, together with the regulations issued thereunder, which are printed *in extenso* below.

A—Ordinance of December 16th, 1912.

B—Regulations of January 5th, 1914.

C—Regulations of April 1st, 1919.

ORDINANCE OF DECEMBER 16TH, 1912.

A 1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."

2. The expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraph Ordinance, 1895," without the aid of any wire connecting the points from and at which the messages or other communications are sent or received.

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3 The Governor may, whenever he shall deem it expedient to do so, licence the establishment of any wireless telegraph station or

the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor in Council may determine, and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Public Prosecutor.

(2) If a magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed, or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor in Council may make regulations for all or any of the following matters:—

(i) For prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(ii) for prescribing the fees payable on the grant of any licence;

(iii) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(iv) for prohibiting, except with the special or general permission of the Postmaster-General of the Colony, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Colony;

(v) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (iii) (iv) and (v) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless tele-

graphy a licence for that purpose shall be granted, subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any article seized, be liable to a fine of five hundred dollars.

(2) All convictions, forfeitures and fines under this Ordinance or any Regulations made thereunder may be had and recovered before a district court.

REGULATIONS.

B The following Regulations, dated January 5th, 1914, were made under the "Wireless Telegraphy Ordinance, 1912":—

1. All apparatus for wireless telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship whether British or foreign shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Postmaster-General of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whether British or foreign while in the waters of the Colony shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

THE WIRELESS TELEGRAPHY ORDINANCE, 1912.

REGULATIONS UNDER.

C In exercise of the powers conferred by section 6 of the Wireless Telegraphy Ordinance, 1912, the Governor in Council is pleased to make the following regulations:—

1. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling, or (b) the working of any wireless telegraph station lawfully

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control

5. The Regulations made on the 30th December, 1918, and published as Notification No. 5 in the *Gazette* of the 3rd January, 1919, are hereby cancelled.

SUDAN

A detailed map of the Anglo-Egyptian Sudan. The map shows the Nile River system, including the White Nile and Blue Nile, and the Red Sea to the east. Major cities like Khartoum, Omdurman, and Port Sudan are marked. Neighboring regions such as French West Africa, Belgian Congo, Abyssinia, and Eritrea are also labeled. A scale bar indicates distances in English miles (0, 100, 200, 300). A note in the top left corner states: 'Public correspondence with ships'.

lies in the hands of a Governor-General appointed by Egypt with the assent of Great Britain. All ordinances, laws and regulations are made by the Governor-General in Council.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
<i>Post and Telegraph Dept.—</i> Lieut.-Col. J. P. Moir, D.S.O., R.E.	Director of Posts and Telegraphs	G.P.O., Khartoum
Major J. A. F. Mair, M.C.	Assistant Director of Posts and Telegraphs ..	G.P.O., Khartoum
Mr. H. B. Sayer	Deputy Assistant Director for Wireless Duties	G.P.O., Khartoum
<i>Superintending Engineers' Dept.</i> (<i>Wireless Section</i>)— Staff-Sergt. W. Finding, R.E. (<i>Vacant</i>)	Wireless Inspector Mechanic Wireless Inspector Mechanic	G.P.O., Khartoum G.P.O., Khartoum

The wireless inspectors act as superintendents of groups of stations. The other personnel at the stations consist of European foreman engineers where possible in charge of groups of stations, native telegraphmasters and assistants, and native engine drivers and assistants.

ORGANISATION.

The first wireless installation in the Sudan was fitted at Port Sudan in the beginning of 1915, the first three inland stations, including those at Malakal and Gambela, being fitted in the autumn of the same year.

None of the stations is at present fitted with apparatus suitable for communication with aircraft. When the C.W. set at Khartoum approaches completion, the stations at Malakal and Mongalla, and subsequently the others, will be fitted with an alternative apparatus for receiving C.W. signals, but will still retain their spark transmission.

None of the stations transmits time, weather or meteorological signals.

ADMINISTRATION.

The Regulations affecting Radiotelegraphy in the Sudan are carried out under an Ordinance issued by the Governor-General, and dated at Khartoum, June 4th, 1906. No special regulations have been issued in pursuance of the Ordinance of 1906, and the service is conducted under the Provisions of the International Radiotelegraph Convention, 1912, and the Regulations for its execution. No licences for private wireless stations have hitherto been issued.

A—Wireless Telegraph Ordinance.

AN ORDINANCE FOR CONSTITUTING
WIRELESS TELEGRAPHY A
MONOPOLY OF GOVERNMENT.

No. 2 of 1906.

A This Ordinance may be cited as "The Wireless Telegraph Ordinance, 1906."

No person shall instal or make use of any apparatus for Wireless Telegraphy or transmit or receive messages by means of any such apparatus within the Sudan except the Department of Telegraphs or a duly authorised officer or official of the Sudan Government, unless such person is in possession of a special licence in writing from the Governor-General.

SWEDEN

(See map on p. 350.)

THE territory of the Kingdom of Sweden includes the eastern and main part of the Scandinavian peninsula. In the extreme north and north-east Norway and Finland are her neighbours. The border on the Finnish frontier is the Torne Elf, a river running from north to south, and falling into the northern end of the Gulf of Bothnia. Norway lies on the west of Sweden; and the Kiel, a chain of highland plateaux and mountains, forms the natural boundary thereof. The Kattegat to the south-west and the Baltic in a southerly and easterly direction separate her from the European continent.

The length of the country is estimated to be 2,500 kilometres from 69° north to 55° south latitude, and the size 450,600 square kilometres. Population about 6 millions.

Sweden is a constitutional monarchy. The Parliament consists of two chambers, of which the second chamber is directly elected by the people, and the first by the municipalities, in a somewhat indirect way.

The Cabinet is appointed by the King, and is supposed to be backed by a Parliament majority. The constitution rests on the fundamental law of 1809, revised in 1865.

CONTROL.

Wireless telegraphy, except in so far as the Navy is concerned, has been placed in the hands of the Kungliga Telegrafstyrelsen, which is a body under the supervision of the Minister of Public Works, and of which the Radio Bureau forms a special department.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. G. Svensson	Minister of Public Works	Stockholm
Mr. Sven Ludvig Herman Rydin ..	Director-General (Head of the Kungliga Telegrafstyrelsen)	Do.
Mr. S. Ljungquist	Chief of Radio Bureau	Do.
Mr. A. S. Litström	Inspector of Wireless Installations	Do.
Mr. J. G. Holmström	Director of Radiotelegraphic Instruction	Do.

The first land station in Sweden was organised and owned by the Swedish Navy. At present 5 land stations belong to the Royal Swedish Telegraph Administration, 2 to the Swedish Navy, and one to the State Railways.

On January 1st, 1919, the Swedish Government took over permanently all wireless telegraphy in Sweden and on board Swedish merchant ships. Hitherto, the Société Anonyme Internationale de Télégraphie sans Fil in Brussels, controlling the Marconi as well as the Telefunken patents in Sweden, had a virtual monopoly in the Mercantile Marine, but by means of a friendly arrangement between the Swedish Government and the S.A.I.T., the former have acquired the patent rights of the latter.

No private companies, societies or individuals are permitted to work wireless telegraphy or erect stations without a concession from the Government. There are no wireless clubs or societies.

ORGANISATION.

Wireless telegraphy was first employed by the Swedish Navy in 1902, and was at the same time installed on the fortresses near Vaxholm, off Stockholm, on the Baltic coast. Wireless rapidly developed in the Navy, and only a few years after the first trials every ship was equipped. In 1904 a ship station and shore station were built in Karlskrona, but some years elapsed before wireless was introduced into the Mercantile Marine. In 1910 the s.s. *St. Paul*, of Gothenburg, was fitted with a Marconi installation, and soon afterwards there was much wireless activity amongst Swedish shipowners, so that by the end of 1920 some 90 ships of the Mercantile Marine were carrying wireless.

For ship and shore traffic there are stations at Boden, Göteborg, Hernösand, Karlskrona, Tingstäde on the Island of Gotland, and at Vaxholm, near Stockholm. An important 50-kilowatt station has been erected near Karlsborg and some more stations have been completed, but detailed particulars are not yet available.

LIST OF INSTALLATIONS.

Land stations for public traffic to ships	7
Land stations for restricted public traffic	2
Ship stations on Government vessels	51
Ship stations on privately owned vessels	90

ADMINISTRATION.

Wireless telegraphy and telephony are controlled by the Act of August 31st, 1907, and several sets of regulations.

The following is the list of the texts of the Swedish Laws and Regulations, which will be found appended hereto:—

A—Act of August 31st, 1907.

B—Royal Decree of June 20th, 1913.

C—Resolution of Director-General of Telegraphs, August 22nd, 1913.

D—Extracts from Statute 131, dated August 10th, 1914, and Statute 514 of December 23rd, 1915.

E—Royal Decree, dated September 4th, 1916.

F—Resolution of Director-General of Telegraphs, dated January 12th, 1917.

ACT OF AUGUST, 31ST, 1907.

A CONCERNING THE ESTABLISHMENT AND WORKING OF INSTALLATIONS OF RADIOTELEGRAPHY AND RADIOTELEPHONY.

1. Whosoever desires to establish in Sweden, on land or on board a vessel permanently moored in Swedish waters, an electric installation of radiotelegraphy or radiotelephony for public or private use must apply for an authorisation from the King.

2. The authorisation of the King must likewise be applied for, by any person or persons desiring to establish on board a Swedish vessel other than permanently moored, an installation of the kind referred to in Paragraph 1.

3. The authorisation granted by the King as prescribed in paragraphs 1 and 2, can only be granted for a certain period. In granting the authorisation, His Majesty prescribes under the reservation of private rights, the manner and conditions under which the installation may be established and worked.

4. Whosoever establishes or works, without the authorisation of the King or contrary to the provisions prescribed in the authorisation, an installation within the meaning of the present law, is liable to a fine of from 25 to 1,000 kronen if the penalty incurred by this contravention is not included in the Penal Code.

5. If an installation within the meaning of the present law has been established without the authorisation of the King, or contrary to the provisions prescribed simultaneously with the authorisation, or if the authorisation has been revoked later by the King, it is the duty of the Governors of Provinces to take the necessary steps to prevent any use being made of the installation.

6. Every fine imposed under the present law reverts to the State. Fines not paid on account of the insolvency of the delinquent are expurgated by terms of imprisonment as prescribed in the Penal Code.

7. The provisions of this law do not apply to State installations.

8. All regulations and all dispositions concerning foreign vessels not permanently moored in Swedish waters, which may be considered necessary for the proper working in Sweden of installations within the meaning of the Act, are made by the King.

ROYAL DECREE OF JUNE 20TH, 1913.

B WHICH CAME INTO FORCE ON JULY 1ST, 1913, REPLACING THAT OF AUGUST 31ST, 1907 (*see* YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913, pp. 151-2).

1. The working of installations of radiotelegraphy or radiotelephony on board a foreign vessel not permanently moored in Swedish waters is, except in cases of distress, prohibited in those parts of the Swedish Archipelago and Swedish waters near to the coast stations which shall be designated by the Director-General of Telegraphs acting conjointly with the Admiralty.

It is the duty of the Director-General of Telegraphs, acting conjointly with the Admiralty, to communicate these provisions to navigators in the way he judges most convenient, and likewise to inform the Governors of the Provinces concerned.

2. In order to exploit such stations in a Swedish port on board foreign vessels above referred to a special authorisation of the General Direction of Telegraphs, acting in conjunction with the Admiralty, must be obtained: the parties interested shall further more be bound to conform to the instructions, detailed edicts, if necessary, made by the Director-General of Telegraphs.

3. When an installation of the kind referred to above is exploited on board one of the foreign ships above-mentioned, the interested parties, if no regulation exists to the contrary, shall conform to the instructions fixed by the International Radiotelegraphic Convention which are in force with the service regulations thereto annexed.

4. Every contravention of this Decree, or of the regulations prescribed by the Director-General of Telegraphs in virtue of Article 2 above, will be subject to a fine of 25 to 1,000 kronen.

The fines revert to the State. Fines not payable by reason of the insolvency of the delinquent are expurgated by terms of imprisonment as laid down in the Penal Code.

5. The provisions of Article 4 hereof shall not apply to vessels of war.

C The following resolution made by the Director-General of Telegraphs relating to the prohibition of working radiotelegraphic and radiotelephonic installa-

tions in proximity to Swedish coast stations was issued on August 22nd, 1913 :—

In view of the Royal decision relating to the installing of wireless stations on board of certain Swedish vessels :

In view of the Royal Order of June 20th, 1913, relating to the working in Sweden of radiotelegraphic and radiotelephonic installations on board foreign vessels :

The Direction-General of Telegraphs, conjointly with the Admiralty, brings to the notice of interested parties that within a radius of ten nautical miles from the nearest Swedish coast station the operation of radiotelegraphic or radiotelephonic stations established either on board of Swedish vessels or on board of foreign vessels is prohibited during the hours when such coast station is open for traffic, except in cases of distress or for the purpose of corresponding with the nearest coast station.

This resolution does not refer to Swedish ships of war.

(The above Regulation refers to the working of wireless stations on board foreign vessels only whilst they are within the territorial waters of the Swedish Kingdom.)

EXTRACTS FROM STATUTES.

D In addition to the Acts and Regulations printed above, we include below such extracts from the 1914 and 1915 Statutes as apply to wireless telegraphy. These cover Regulations affecting Ship Stations and the various restrictions imposed on their use whilst within Swedish Territorial Waters.

SWEDISH STATUTES, 1914.

No. 131, DATED 10TH AUGUST, 1914.

His Royal Majesty's Gracious Rescript to H.M.'s Telegraph Department concerning prohibition of the use, within Swedish harbour precincts, of electric installations for wireless telegraphy or telephony on board of any vessel of a country at war.

In consequence of the outbreak of war between foreign powers, we have in connection with the provisions of Article 2 of our gracious proclamation of June 20th, 1913, concerning the use, within the confines of the realm, of electric installations for wireless telegraphy and telephony on board of foreign vessels, thought fit to ordain that until further notice it shall not be permitted to use such installations within Swedish harbour precincts on board of any vessel of a country at war. Which is hereby graciously brought to your notice for your cognisance and guidance.

SWEDISH STATUTES, 1915.

No. 514 OF 23RD DECEMBER.

Fifth Chapter.

Equipment of Vessels.

1.—Wireless Telegraph Installation.

ART. 56.

Vessels which must be provided with wireless installation.—Vessels which are used for voyages between different countries or between a country and any of its colonies, possessions or protectorates, shall be equipped with wireless telegraph installation, provided, however—

That such installation shall not be required if the vessel has fewer than 50 persons on board or if although the number on board is 50 or over, this is exclusively due to the fact that the master, by reason of sickness among the

crew or through other compelling, unforeseen circumstances, has been obliged to supplement the crew, or has saved persons in distress at sea, or by reason of obligation, according to law, has taken with him seamen or other persons ;

And that the Board of Trade may, on application, grant exemption from the obligation of having such installation, if the Board, in view of the route or other circumstances concerning the voyage, finds that such installation is not necessary and if such application concerns :—

(a) Vessels which do not go out to a distance of more than 150 nautical miles from the nearest coast ;

(b) Vessels which only in exceptional cases and incidentally have 50 persons or more on board for the reason that they take stowers or stowage labourers with them on a certain part of the voyage, and which on the one hand do not sail from one continent to another, and on the other hand are, during the said part of the voyage, between 30° northern and 30° southern latitude ; or

(c) Sailing vessels which are of rather primitive construction and which it is practically impossible to equip with wireless installation.

ART. 57.

Concession and classes of vessels.—Concerning H.M.'s permission to carry out such installation as referred to in Art. 56, separate enactments have been issued.

In sanctioning such installation as aforesaid the King will fix the class in which the vessel shall be classified, in accordance with the nature of the attendance of the wireless telegraph station.

ART. 58.

Range of the installation.—The wireless installation shall be sufficiently powerful to be able to transmit in day-time, under normal conditions, signals which can be clearly distinguished at a distance of at least 100 nautical miles from the vessel.

ART. 59.

Spare installation.—Vessels which are to be equipped with wireless installation shall have a spare wireless plant. This shall be placed wholly and entirely in the upper parts of the vessel, as high up as possible, and all its parts shall be fitted up so as to be protected as much as possible.

The spare plant shall have a source of power which is exclusively intended for the spare plant, and which can be brought into action most speedily.

The source of power referred to in the second paragraph of this article shall be capable of acting for at least six hours with a minimum range of 80 nautical miles in the case of vessels, for which uninterrupted attendance of the wireless installation shall have been provided, and of 50 nautical miles in the case of any other vessel.

If the main installation meets the requirements of the first and second paragraphs hereof as regards the spare plant the spare installation shall not be required.

ROYAL DECREE OF SEPTEMBER 4TH, 1916.

E r. When circumstances so demand the captain of a Swedish Government ship of war is entitled to prohibit the use of wireless electrical telegraph or telephone on board merchant vessels, whether they be Swedish or foreign, so long as they remain in Swedish territorial waters.

And the warship captain is moreover entitled, if it seem necessary for the observance of his order under the rule, to instruct the lowering of the antennæ.

In case the aforesaid captain has not prescribed a specific period during which the prohibition against using the wireless installation shall remain in force, the installation may be used and the antennæ be hoisted, as soon as the warship is out of range for exchanging visual signals with the merchant vessels.

2. The captain of a merchant vessel who shall violate this rule, or omit to obey any order given in accordance with Par. 1, shall be liable to a fine ranging from 25 to 1,000 kronen.

RESOLUTION OF DIRECTOR-GENERAL OF TELEGRAPHS, DATED JANUARY 12TH, 1917.

F Referring to His Majesty's resolutions conferring concessions on certain Swedish vessels for the

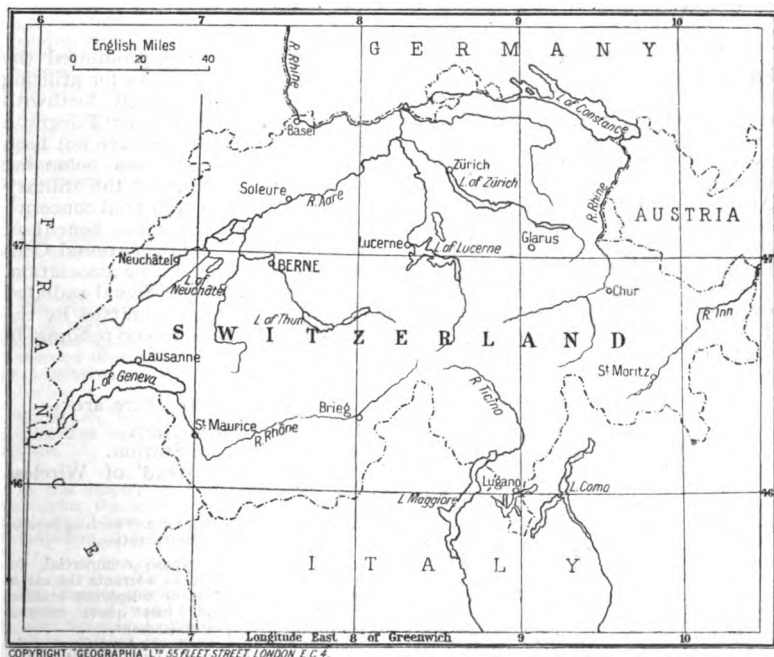
carrying of wireless telegraphic apparatus, and to His Majesty's Decree of June 20th, 1913, regulating the use within the Swedish Realm of wireless telegraph or telephone on the part of foreign vessels, the K. Telegrafstyrelsen (in consultation with the Admiralty) desires to make public proclamation that:—

The prohibition, affecting both Swedish and foreign ships against utilisation of electrical wireless installations, both telegraphic and telephonic, published in the Decree of the K. Telegrafstyrelsen of the 22nd August, 1913, shall be extended to include the whole Swedish archipelago. The only exception to this rule shall be made in favour of foreign vessels in case of distress, and in favour of Swedish vessels which find themselves in a similar predicament, or which may desire to exchange, receive or transmit messages with, from, or to, a Swedish coast station.

SWITZERLAND

THE Swiss Confederation is made up of the union of twenty-five separate political entities, or republics, organised into twenty-two cantons.

The area comprises 15,976 square miles, the population (according to the census of July 1st, 1915) numbers 3,880,500. The country extends from 45° 0' to 48° 0' north latitude, its longitude lying between 5° 0' and 11° 0' east of Greenwich. The length from north to south is 137 miles, the width from east to west 216 miles; the furthest points on its boundary are 223 miles apart.



The first Federal Organisation dates from September 12th, 1848, and the present Constitution came into force on May 29th, 1874. Supreme authority is exercised by the Federal Assembly, which consists of two Councils—the *Ständerath* or State Council, and the *Nationalrath* or National Council. The latter, which represents the Swiss people in its totality, consists of triennially elected members, each member representing a population of 20,000. The *Ständerath* (consisting of forty-four Deputies) represents the cantons, each canton contributing two members.

Both Chambers unite to elect the Federal Assembly, which wields the supreme authority and higher executive of the Confederation.

CONTROL.

Wireless telegraphy in Switzerland is controlled by the Department of Posts, Telegraphs and Railways, but there is no special branch of the department devoted thereto.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. R. Haab	Head of the Department of Posts, Telegraphs and Railways	Berne
Dr. R. Furrer	Director-General of Posts, Telegraphs and Telephones	Berne
M. Hauser	Assistant to the Director-General	Berne

Wireless telegraphy is a State monopoly, based on the general Federal Law affecting telegraphs and telephones, of December 16th, 1907, of which we print below the apposite clauses.

Licences are, however, granted for receiving stations only, available for a limited period, where these are to be used solely for the reception of time and weather signals. We append the form of such contracts.

ORGANISATION.

At the outbreak of the late war the Federal Council prohibited the erection of new wireless stations, and revoked all existing licences for utilising receiving stations. These private installations were accordingly forthwith dismantled, their apparatus being confiscated and stored by the Telegraph and Telephone Department. Up to the present these stations have not been restored, but re-installation has been authorised for stations belonging to public institutions, for general and technical instruction, and the Military Authorities propose shortly to extend this authorisation to industrial concerns. By way of compensation, the Federal Council decided, for the benefit of the dispossessed licences, to carry out the clause of the International Confederation of October 25th, 1913, relative to an international time association.

Starting with August 1st, 1916, the International Time Signal radiated from the Eiffel Tower is on working days telephonically transmitted by the Telegraph and Telephone Department at Berne to subscribers residing in Switzerland.

ADMINISTRATION.

The texts of the ruling Laws and Regulations reprinted here are:—

A—The Federal Telegraph and Telephone Law of 1907.

B—The Licence for Time and Weather Receiving Station.

C—Federal Decree establishing Telephonic instead of Wireless Reception of International Time Signals.

FEDERAL LAW REGULATING THE ORGANISATION OF TELEGRAPHIC AND TELEPHONIC ADMINISTRATION.

(Dated December 16th, 1907.)

CHAPTER I.

A ART. 1.—The right to establish and exploit any form of electrical telegraph and telephone in Switzer-

land, or to issue licences for any such apparatus is vested solely in the Confederation.

ART. 2.—Localities whose commercial, industrial, or political status warrants the establishment of telegraphic or telephonic stations shall contribute their just quota towards the expense of such establishment.

Subject to appeal to the Federal Council the Telegraph and Telephone Administration shall

decide the matter of installation and extent of the facilities granted. The Federal Council shall specify the rules governing the subvention and guarantees to be given by communities and individuals.

ART. 3.—The right of usage of such facilities shall be common to all. No special privilege with regard to fees or priority of transmission or reception shall be granted to any.

Nevertheless, official communications of the Federal and Canton authorities, as well as messages concerning the Service of Posts, Telegraphs, Telephones, and Railways shall have priority over those of individuals.

ART. 4.—The Supreme Direction of Telegraphic and Telephonic Administration shall belong to the Federal Council.

All regulations affecting this branch of service shall be issued by the Federal Council, so far as the latter shall not have delegated its authority to the Postal, Telegraphic, and Railway Departments or to the responsible officials thereof.

ART. 5.—The Federal Council shall conduct all negotiations concerning general telegraphic and telephonic agreements abroad.

Ratification of such agreements must be made by the Federal Assembly.

The Federal Council may, however, finally ratify agreements concluded with bordering countries on the basis of the general conventions affecting telegraphy and telephony.

ART. 6.—The Federal Council shall appoint all telegraphic and telephonic officials and employees. The nomination of individual employees or fixed classes of employees may however be delegated to the Postal and Railway Department or to the Managing Director of Telegraphs and Telephones.

ART. 7.—The immediate superintendence of all the administration of telegraphs and telephones is delegated to the Postal and Railway Department which is moreover entrusted with the necessary executive power.

CHAPTER II.

This chapter contains Articles 8, 9, and 10, which enumerate the classes of chief officials.

CHAPTER III.

This chapter is concerned with the organisation of telegraphic and telephonic zones and the offices and officials to be established in connection therewith. It contains Articles 11 to 16 inclusive.

CHAPTER IV.

Herein are laid down (in Article 17) the classification and maximum salaries of chief officials.

CHAPTER V.

In this chapter we find Articles 18 to 22 embodying the general rules applying to the nomination basis of appointment and responsibilities of the various officials.

CHAPTER VI.

This chapter covers Articles 23 and 24 and concerns itself with offences and penalties. It also includes Article 25 enumerating the previous decrees abolished by this law and Article 26 the formal Direction of Issue.

PROVISIONAL LICENCE FOR TIME AND WEATHER RECEIVING WIRELESS STATIONS.

There is hereby granted to
of

in the canton of a
Provisional Licence to make use of a receiving wireless station which shall be installed in the premises of as well as for the erection of an antenna composed of strands of metres length, between the aforesaid premises and on the following conditions:

1. The erection and upkeep, with all that thereto appertains, shall be carried out in accordance with the regulations laid down by the Federal Council with regard to electric installations, and shall be carried out at the expense of the licensee, who shall have, moreover, to come to an understanding with the corporations or individuals whose property must be hired.

2. The installations granted must not in any way interfere with the working and development of the telegraphic and telephonic systems of the State and/or of the railway companies.

3. The oscillating circuit must be constructed so as to be capable of exact and definite adjustment to a fixed length of wave.

4. The licensee must conform to the rules with regard to wireless telegraphy, which may be laid down, from time to time, by the Federal authorities.

5. The installation granted under this licence must be at all time and in every part accessible to representatives of the administration of telegraphs and telephones entrusted with the duty of control.

6. The installation shall only be used for the reception of time signals. Any other employment thereof (for instance, exchange of messages with radiotelegraphic stations in Switzerland or outside its frontiers, as well as the communication of any signals that may be received, or of their tenor, to third parties) will be considered as a violation of the rights of the confederation (see the provisions of Articles 23 and 24 of the Federal Law of December 16th, 1907, dealing with the organisation and administration of telegraphs and telephones).

7. When changes of any importance have to be made in the installation, or when its location has to be shifted, or if it is to be worked by any other person, the licensee is required to immediately advise the administration of telegraphs and telephones concerning the change.

8. The present licence may be withdrawn at any time and for any period, and this may be done without conferring the right to any indemnity. In such an event the whole installation must be displaced at the cost of the licensee within fifteen days from the period fixed for the expiry of the licence.

9. The licensee shall be responsible for any loss or expense incurred by the Federal administration in consequence of failure to carry out the terms of the present licence.

10. The licensee shall pay to the Administrator of Telegraphs and Telephones a fixed fee of five francs payable at the Central Local Telegraph Centre of to defray the inspection and to cover the cost of registering the licence.

Given at Berne the day of

I/We, the undersigned, after having acquainted myself/ourselves with the conditions and stipulations hereinabove set forth, declare myself/ourselves willing to accept them and abide by them.

The day of 19 .
(Signed)

TELEPHONIC TIME SIGNAL SERVICE.

SECTION A.

C Decree of the Federal Council dated July 21st, 1916.

The Swiss Federal Council, acting on the suggestion of its Postal and Railway Department, and in view of the Federal decision of March 27th, 1914, decrees:

1. That the international radiotelegraphic time signal radiated daily at 10.56 and at 11 o'clock (H.E.C.) from the Paris Observatory by the Eiffel Tower Station, shall be—during working days—retransmitted telephonically by the Administration of Swiss Telegraphs and Telephones at Berne.

2. Any regular telephone subscriber may take up a subscription to the telephonic time signal, arranging therefor with his telephone exchange.

3. Subscriptions are monthly or annual, and are valid for the civil month or civil year.

The rates of subscription are:

(a) Fr. 2.50 per month, or part of a month.

(b) Fr. 25 per year.

For ten months at least they must be paid in advance.

4. Over and above the possibility of regular subscriptions, telephone subscribers may arrange to be supplied with odd time-service messages on such circuits as receive them. Each separate message will be charged for at the rate of 20 centimes, and this fee will be included, with ordinary conversation charges, in the monthly account.

5. The Administrator of Telegraphs and Telephones will accept no responsibility with regard to any irregular working of the Telephonic Time-Signal Service; nevertheless every endeavour will be made to assure and develop the service.

6. If any interruption in telephonic transmission of the time-signal last for more than seven consecutive days, without this arising from any fault on the part of the subscriber, the subscription fee will be refunded proportionately to the duration of the interruption.

7. Every effort shall be made to carry this edict into effect on and from the 1st August, 1916.

The Postal and Railway Department shall take steps to carry this out.

Dated Berne, 21st July, 1916.

SECTION B.

Method of Administration.

1. Every telephone subscriber who desires to subscribe to the Telephonic Time-Signal Service must address a written request to his telephone exchange showing exactly what kind of subscription he desires to take up (see Article 4 of this section, paragraphs (a) to (c)).

2. The telephone exchange which receives an application for such a subscription may, under this rule, accede to the application immediately.

On the reception of a first request for a subscription, the Telephone Exchange puts itself immediately in touch either with the Central Station through whose intermediary the time signal will be sent, or with its own local centre.

3. The originals of all applications for subscription must be sent to the Chief Office, through the intermediary of the local centres.

4. (a) The fees for annual subscriptions must be paid in advance for December, together with the half-yearly fees for the ordinary telephone service.

For periods of less than ten months, starting with the first day of the subscription and until the end of the year, the tax is collected on the basis of the tariff applicable to monthly subscriptions.

An annual subscription becomes automatically renewed from year to year, and may be cancelled at any time upon giving eight days' notice. If, however, it has not run for at least ten months, counting from the beginning of the year up to the date of cancellation, the rate of tax applicable is that of a monthly subscription.

(b) Fees for monthly subscriptions for a settled period (temporary subscriptions) are payable in advance, and for the whole duration of the subscription.

In default of advice to the contrary on the part of the subscriber, his subscription is considered as cancelled on the expiry of the agreed period.

(c) Monthly subscriptions of indeterminate duration are renewed automatically month by month. They may be cancelled at the end of a month by notice given at least eight days in advance; the subscription fees being payable monthly and in advance.

(d) Requests for reception of odd time-service messages are only granted in the case of lines of some importance, and on condition that they are made at latest by 10.50 a.m. Applicants are rung up at 10.55 a.m.

Applications are noted by entering the number of the subscriber on tickets specially prepared for this purpose. These tickets serve as the basis for the rendering of accounts.

When it has not been possible to attend to an application, because the subscriber's line was engaged his enquiry is charged as a local conversation. Fees for odd time-signal messages are charged for at the end of each month on the same invoice as conversation charges.

5. Subscription rates and charges made for odd time-signal messages come under subsection 2(c) of the accounts for messages, and must in consequence be entered, duly classified (see Article 4 of section (a) above) on Form No. 600 under "Other Receipts."

6. The commission allowed to exchange proprietors attached to central stations of Class III, and of intermediary stations, who have to co-operate in the telephonic time-service amounts to 25 per cent. on receipts. This commission is taken into consideration when the annual telephone accounts are adjusted.

Time-service communications in transit should be recorded in the same way as ordinary conversations in transit.

7. When the time-signal message is transmitted to an intermediary station linked up with a central station of Class III, the latter has only a right to a commission of 2 cents per communication in transit, and the commission of 25 per cent. on the message is allotted to the proprietor of the intermediary station.

TAHITI

(See FRANCE.)

TASMANIA

(See AUSTRALIA.)

TONGA ISLANDS

(See PACIFIC ISLANDS.)

TONQUIN

(See FRANCE.)

TRINIDAD AND TOBAGO

THE Colony of Trinidad and Tobago includes the island of Trinidad, which is about 69 miles long by 52 miles wide, with an area of 1,754 square miles, and the island of Tobago, which is about 26 miles long and 7½ miles wide, with an area of 114 square miles.

Trinidad is situated about 10° north of the Equator, between 61° and 62° west longitude, and Tobago is to the north-east of Trinidad, about 11° 9' north latitude and 60° 12' west longitude. They form a Crown Colony, and their government is administered by a Governor, assisted by an Executive Council and Legislative Council.

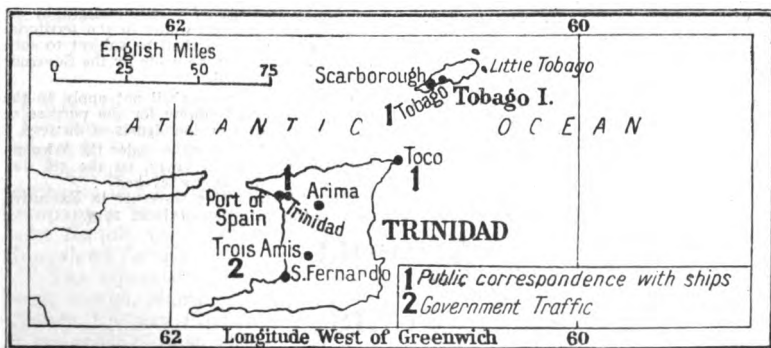
CONTROL AND ORGANISATION.

The first wireless station in Trinidad was erected in 1905 at the north-western corner of the island to obtain a direct sea line with Tobago, and merely to bring Tobago into telegraphic communication with Trinidad and thus with the outer world. It was a 2-kw. Lodge-Muirhead station. Subsequently this station was removed, and a 5-kw. Marconi station was erected in Port of Spain, with a daylight range of about 350 nautical miles and 1,000 nautical miles at night. Public ship and shore service is maintained therewith.

The Tobago station is on Fort King George, east of Scarborough, the capital of Tobago, and is a 3-kw. station (Marconi and Lodge-Muirhead), with a daylight range of about 350 nautical miles, and about 600 nautical miles at night.

The Trinidad and Tobago stations are open day and night for commercial service. There are no relaying charges between the two stations, and if ships are unable to obtain communication with Trinidad they endeavour to communicate with Tobago.

The Trinidad and Tobago Government Wireless Service is a branch of the Public Works Department and under the control of the Director of Public Works with the following staff :—



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OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official	Title.	Address.
C. M. Cross	O C. Wireless Station	Trinidad and Tobago
L. W. Pouchet	Chief Operator	Trinidad
A. E. Wilson	Second Operator	Tobago

ADMINISTRATION.

The Law and Regulations governing radiotelegraphy are reprinted below :—

A—Ordinance No. 6 of 1917.

B—Regulations.

ORDINANCE No. 6 of 1917.

ISSUED MAY 8TH, 1917.

A Be it enacted by the Governor of Trinidad and Tobago with the advice and consent of the Legislative Council thereof as follows :—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1917.

2. (1) It shall not be lawful for any person to use or establish in this Colony any apparatus or installation for the purposes of wireless telegraphy, without first obtaining from the Governor a licence in that behalf, to be granted on such terms and conditions as the Governor may from time to time prescribe.

(2) Any person contravening the provisions of this section is liable on summary conviction before a Magistrate to a fine not exceeding £50 or to imprisonment with or without hard labour, for any term not exceeding six months, and the apparatus and installation in respect of which a conviction is obtained may by order of the convicting magistrate be forfeited to the use of His Majesty the King.

3. (1) No person shall work any apparatus for wireless telegraphy installed on any merchant ship whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor in Executive Council.

(2) Such regulations shall be published in the *Royal Gazette*.

(3) Any person contravening, or permitting, procuring, or assisting in the contravention of, any such regulation is liable, on summary conviction before a magistrate, to a penalty not exceeding £50, or to imprisonment, with or without hard labour, for any term not exceeding six months.

4. Any person who unlawfully and maliciously :—

(a) Injures, removes or destroys any apparatus or installation for the purpose of wireless telegraphy, or any part of such apparatus or installation ; or

(b) Obstructs or prevents in any manner whatsoever the sending, conveyance or delivery of any message or signal by wireless telegraphy :

is guilty of a misdemeanour and is liable to

imprisonment, with or without hard labour, for any term not exceeding two years.

5. The Wireless Telegraph Ordinance (No. 236) and the Wireless Telegraphy Ordinance 1909 are hereby repealed.

Passed in Council this twenty-seventh day of April, in the year of Our Lord one thousand nine hundred and seventeen.

REGULATIONS MADE UNDER THE WIRELESS TELEGRAPHY ORDINANCE, 1917.

B 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (a) Naval signalling or (b) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be worked so as not to interrupt or interfere with the transmission of any messages between the wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony, except with the special or general permission in writing of the Director of Public Works of the Colony. Such special or general permission shall only be given to any ship subject to the condition that it shall not exchange signals with another ship except on the private business of the owners.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters of the Colony shall be subject to such further rules as may be made by the Governor in Executive Council.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering the signals of distress.

5. The regulations made under the Wireless Telegraphy Ordinance, 1917, on the 5th day of July, 1917 are hereby revoked.

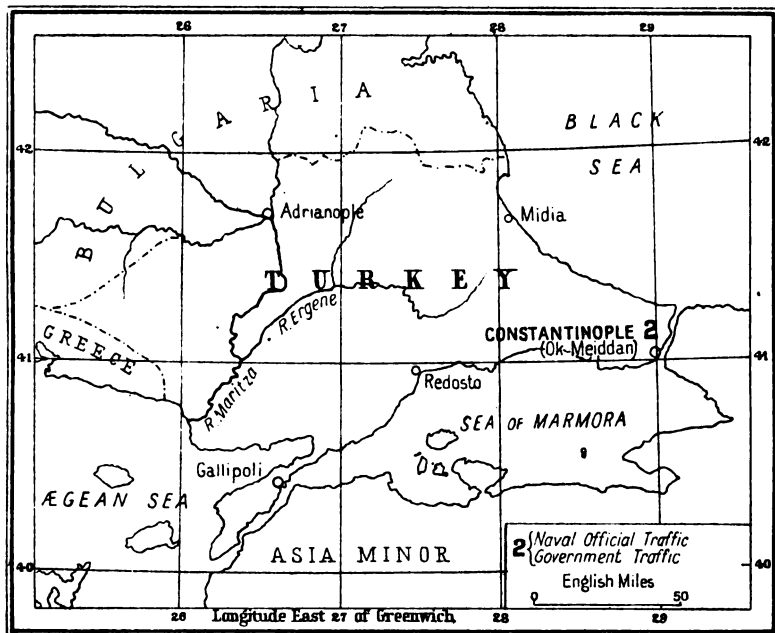
Made by the acting Governor in Executive Council this 12th day of June, 1919.

TRIPOLI

(See ITALY.)

TUNIS

(See FRANCE.)



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TURKEY

STABLE conditions in the Ottoman Empire are not yet re-established sufficiently to enable us to obtain any information in regard to radio-telegraphy and telephony in that country, but we hope, in our next volume, to print the full text of any laws and regulations which have been published in the interim. As far as is known there is one station for Government traffic only.

CONTROL.

OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. Réák Halid ..	Director-General of Posts, Telegraphs and Telephones	Constantinople

UGANDA

THIS Protectorate, with that of the Kenyaland Colony and East African Protectorate, constitutes the whole area on the East Coast of Africa subject to British rule.

Uganda came under British dominion in 1890, and a portion of the territories was for a time administered by the Imperial British East African Company. The northern boundary is limited by the Sudan, the eastern by Lake Rudolf, the western by the Belgian Congo, and the southern by the Kenyaland Colony.

The administrative centre is Entebbe, the native capital of Uganda being Mengo, Kampala. Nile steamers from Khartoum ply to Rejaf. The Uganda Railway runs from Kisumu on Lake Victoria Nyanza to Mombasa on the coast of East Africa.

CONTROL.

OFFICIAL CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. W. G. Tucker ..	Telegraph Engineer in Charge	Entebbe

ADMINISTRATION.

Wireless telegraphy is administered under the following :—

ORDINANCE.

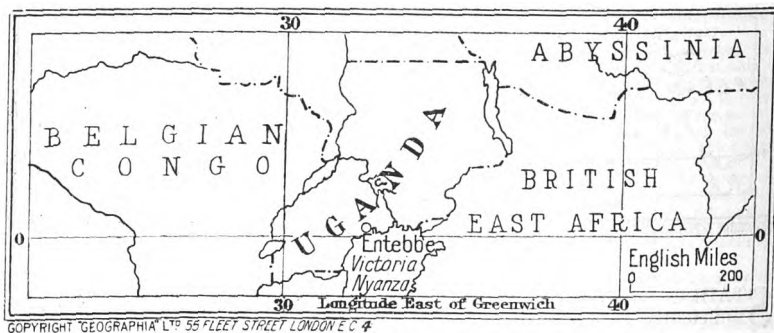
1. This Ordinance may be cited as "The Wireless Telegraphs Ordinance, 1908."

2. No person shall use or establish any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening the terms of this section shall be liable on conviction to a fine not exceeding Rs. 1,500 or imprisonment

of either kind for a term not exceeding twelve months, and any apparatus or installation in respect of which an offence under this section is committed may be forfeited and sold or disposed of as the Governor may direct.

3. It shall be lawful for the Governor from time to time by rules to prescribe the terms and conditions upon which licences to use or establish apparatus or installations for the purpose of operating wireless telegraphs may be granted.



UNION OF SOUTH AFRICA

(See SOUTH AFRICA, UNION OF.)

UNITED KINGDOM

THE correct title for the heart of the British Empire is that of the "United Kingdom," for just as we are a mixture of races, so are we also a mixture of nationalities. Wales was linked with England in the thirteenth century under Edward I, and in the Tudors has contributed a line of kings to the British throne. The Scotch joined hands with the English under James VI of Scotland and First of England, the Stuart Dynasty originating in the Northern Kingdom. Ireland remained a separate entity until the Act of Union, which came into force on January 1st, 1801.

The total area of the British Isles is reckoned at 121,377 square miles, whilst in 1914 the population numbered 46,500,000. In the same year there were 23,701 miles of railway and 2,886,025 miles of telegraphic and telephonic wires (exclusive of wireless aeriels).

Our own country is proud to share with Italy in the production of Senatore Marconi. If his father was Italian, his mother was Irish; and if Italy was the place of his birth, England has been the chief scene of his labours. The first British patent for Wireless Telegraphy was No. 12,039, lodged by the Italian inventor in 1896. Ever since that date the United Kingdom has been in the forefront of wireless activities, and British radio-telegraphy is continually expanding in all directions.



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CONTROL.

The Postmaster-General is responsible for the administration of wireless telegraphy in Great Britain and Ireland.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Rt. Hon. A. H. Illingworth, P.C., M.P.	Postmaster-General	General Post Office, London, E.C.
Sir George Evelyn P. Murray, K.C.B...	Secretary to Post Office..	Ditto.
Mr. F. J. Brown, C.B.E., M.A., B.Sc...	Assistant Secretary to Post Office	Ditto.
Mr. J. I. De Wardt, O.B.E.	Principal	Ditto.
Mr. G. O. Wood	Ditto	Ditto.
Mr. F. W. Phillips	Ditto	Ditto.

DEPARTMENT OF THE INSPECTOR OF WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Comdr. F. G. Loring, R.N., M.I.E.E...	Inspector of Wireless Telegraphy	General Post Office, London, E.C.
Lt.-Col. C. G. C. Crawley, R.M.A., M.I.E.E.	Deputy Inspector of Wireless Telegraphy.	Ditto.
Mr. F. Addey, B.Sc. (Lond.), A.M.I.E.E. } Mr. O. F. Brown, M.A. (Oxon.), B.Sc. } (Lond.)	Assistant Inspectors of Wireless Telegraphy.	Ditto.

ORGANISATION.

Early in 1914 a Bill was presented to the House of Commons by the President of the Board of Trade to amend the laws relating to merchant shipping so as to give effect to the International Convention for the Safety of Life at Sea, signed at London on January 20th, 1914. Under the title "Merchant Shipping (Convention) Act, 1914," this Bill was passed in August, 1914, and was due to come into force on July 1st, 1915, but has not yet been put into operation. Part III of the Act refers to wireless telegraphy and is printed below.

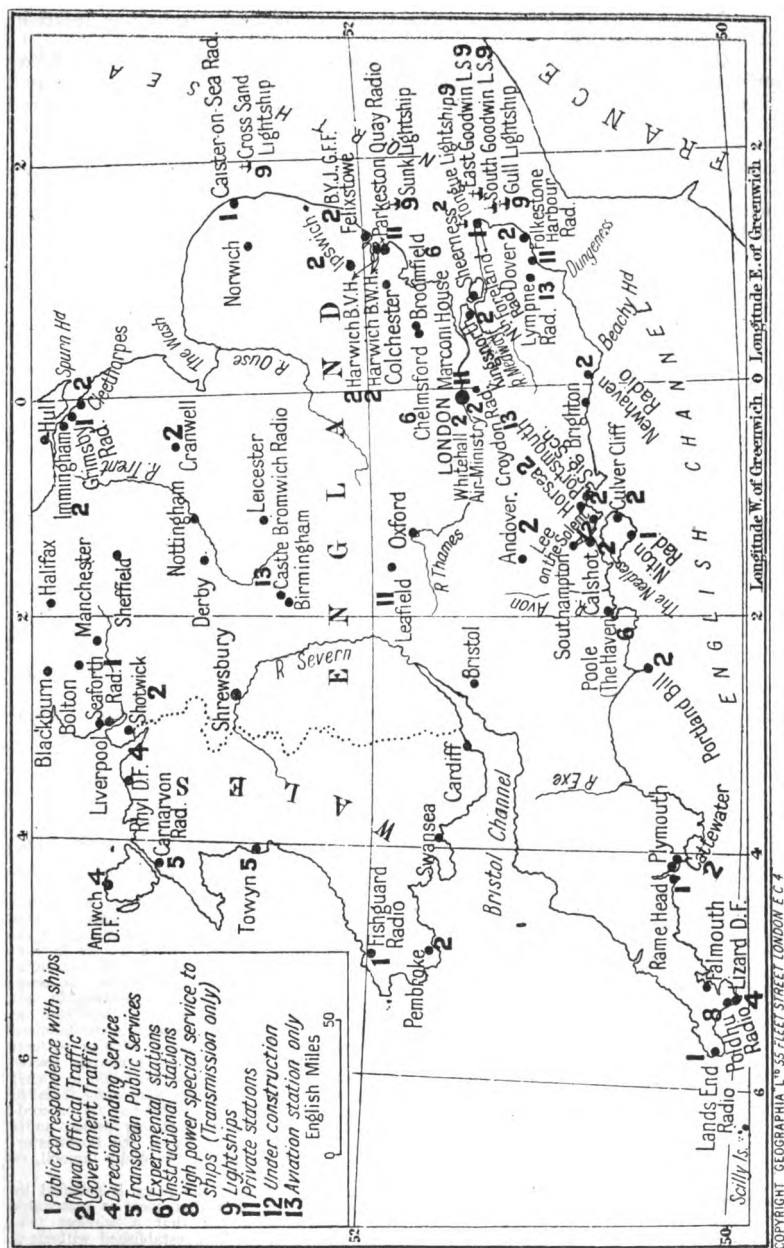
In the following pages we have included an extract from the Defence of the Realm (Consolidation) Regulations, 1914, which relates to the prohibition of the possession of wireless telegraphic apparatus, unless with the official permission of the Postmaster-General.

A new Act—the Merchant Shipping (Wireless Telegraphy) Act, 1919—came into operation on September 1st, 1920. We print the Act and rules herewith.

The form of Ship Licence ("D" below) is no longer operative, a fresh form being in preparation. In the meantime new installations are authorised by letter.

Regarding experimental and private business stations, a new Wireless Telegraphy Bill is to be introduced into Parliament, and when this has been passed the various forms of experimental and private business licence will be revised. In the meantime the General Post Office is issuing temporary experimental permits for (a) transmitting and receiving, and (b) receiving only, on the conditions stated below.

The partial removal of restrictions on amateur working which has already taken place was immediately productive of a keen stimulus to amateurism. The Wireless Society of London and kindred associations have resumed activities with more than pre-war ardour, and fresh societies are springing up in various parts of the country. (*For lists of Amateur Societies, see special section of Year-Book.*)



According to the latest statistics there are 85 land (excluding amateur) stations in operation.

Under the Air Navigation Regulations, 1919, extracts of which we print below, it is unlawful to establish or work any wireless telegraph apparatus in any British aircraft, except under and in accordance with a licence granted by the Postmaster-General, containing such conditions as may be approved by the Secretary of State for Air. A form of licence for the wireless installation on aircrafts reproduced below. The Syllabus of examination for certificate to act as wireless operator in aircraft is not yet definitely settled, but certificates in special cases are issued by the Post Office on the recommendation of the Air Ministry.

ADMINISTRATION.

The following is the list of items to be found below :—

- A**—Wireless Telegraphy Act, 1904.
- B**—Order in Council, February 29th, 1908.
- C**—Wireless Telegraphy (Foreign Ships) Regulations, 1908.
- D**—Ship Stations Licence.*
- E**—Private Business Licence.*
- F**—Board of Trade Notice (Signalling Practice).
- G**—Merchant Shipping (Convention) Act, 1914. (Part III.)
- H**—Defence of the Realm Regulations, 1914.
- I**—Extracts from *London Gazette*, April 29th, 1919.
- J**—Circular to Owners and Masters of British Merchant Ships. (Part II.) Relaxation of Restrictions on Use of Wireless Telegraphy, dated November 22nd, 1919.
- K**—Merchant Shipping (Wireless Telegraphy) Act, 1919.
- L**—Rules made under Merchant Shipping (Wireless Telegraphy) Act.
- M**—Postmaster-General's authority for the use of Transmitting and Receiving Apparatus for Amateurs.
- N**—Postmaster-General's authority for the use of Receiving Apparatus only for Amateurs.
- O**—Extract from Convention relating to International Air Navigation, 1919.
- P**—Form of Licence for Wireless on Aircraft.
- Q**—Admiralty Notice to Mariners No. 524 of March 25th, 1920.
- R**—Admiralty Notice to Mariners No. 838 of May 22nd, 1920.
- S**—Admiralty Notice to Mariners No. 952 of June 15th, 1920.
- T**—Air Ministry Notice to Airmen No. 103 of September 30th, 1920.

WIRELESS TELEGRAPHY ACT, 1904.

A Following the termination of the meeting of the delegates at the International Conference in Berlin in 1903, the British Government drafted a Wireless Telegraph Act to define the official position of the Postal and Telegraph Department in the United Kingdom in regard to the new development. The Act received Royal assent on August 15th, 1904, and the text is as follows :—

1. (1) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy, in any place or on board any British ship except under and in accordance with a licence granted in that behalf by the Postmaster-General.

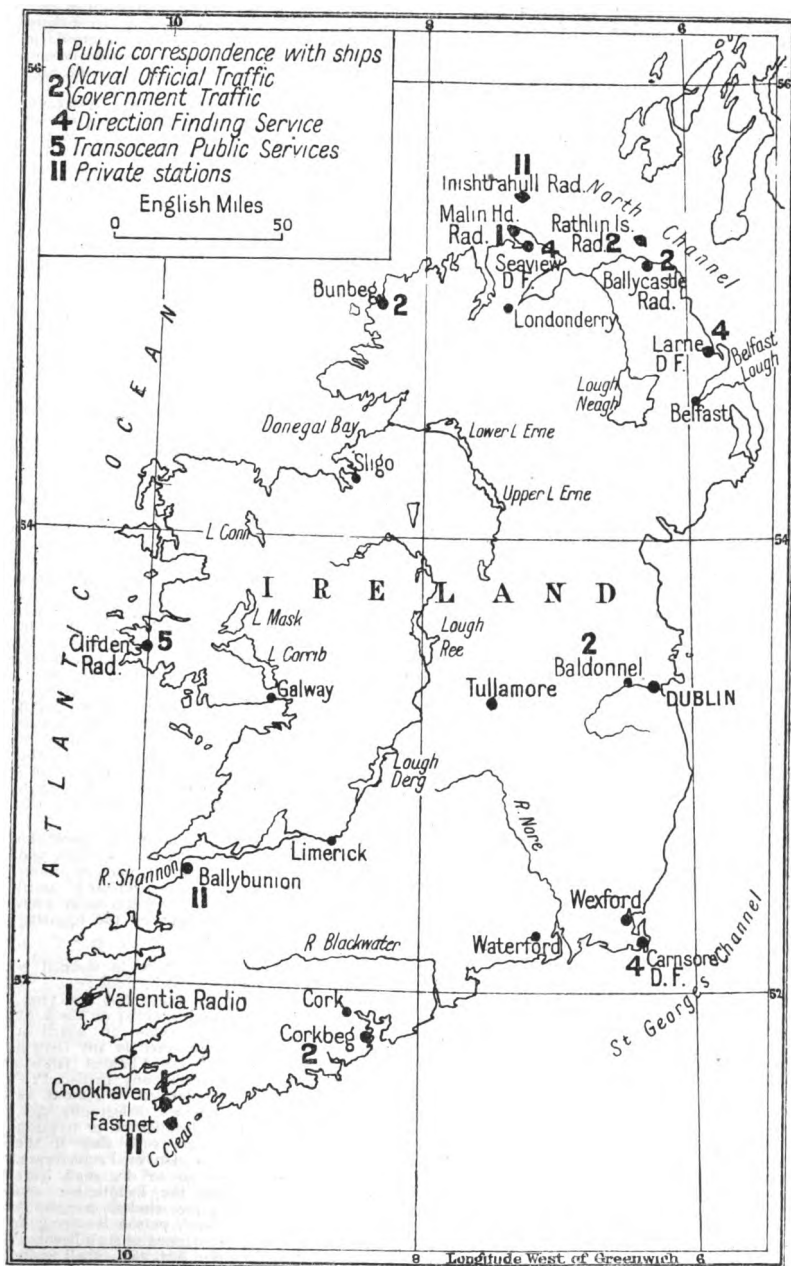
(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms, conditions, and restrictions on and subject to which the licence is granted, and any

such licence may include two or more stations, places, or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable, on conviction under the Summary Jurisdiction Acts, to a penalty not exceeding ten pounds, and on conviction on indictment to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade.

(4) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship

* The terms of these licences are no longer operative, and new forms of licence are likely to be issued shortly.



within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade, and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) Sections 684, 685, and 686, of the Merchant Shipping Act, 1894 (which relate to the jurisdiction of courts and justices), and section 693 of the same Act (which relates to distress for sums ordered to be paid by masters and owners of ships), shall apply to the jurisdiction of courts and justices in respect of ships, and to distress under this Act.

(6) The Postmaster-General may make regulations for prescribing the form and manner in which applications for licences under this Act are to be made, and, with the consent of the Treasury, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in the Telegraph Acts 1863 to 1904, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received; Provided that nothing in this Act shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. (1) Where the applicant for a licence proves to the satisfaction of the Postmaster-General that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted, subject to such special terms, conditions, and restrictions as the Postmaster-General may think proper, but shall not be subject to any rent or royalty.

(2) Where an applicant for a licence satisfies the Postmaster-General that a wireless telegraph station is to be used solely for the transmission of telegrams which are within the first or second exception from the exclusive privilege of transmitting telegrams conferred upon the Postmaster-General by the Telegraph Act, 1869, a licence for that purpose, if granted, shall not be subject to any rent or royalty.

(3) It shall be lawful for the Postmaster-General, due regard being had to the maintenance and exercise of effective control over wireless telegraphy, to grant special licences at reduced terms for the establishment and working of wireless telegraph stations to be used exclusively for the transmission within the United Kingdom of news to public registered newspapers. A schedule of all reduced rents or royalties imposed by any special licences shall be laid before both Houses of Parliament within fourteen days of the commencement of the session next succeeding the grant of any such licences.

3. (1) This Act may be cited as the Wireless Telegraphy Act, 1904, and may be cited with the Telegraph Acts, 1863 to 1904.

(2) This Act shall extend to the whole of the British Islands and to all British ships in the territorial waters abutting on the coast of the British Islands, and the Royal Courts of the Channel Islands shall register this Act accordingly.

(3) His Majesty in Council may order that this Act shall, subject to any conditions, exceptions, and qualifications contained in the order, apply during the continuance of the order to British ships whilst on the high seas.

(4) A person shall not work any apparatus for wireless telegraphy installed on a foreign ship whilst that ship is in territorial waters otherwise than in accordance with regulations made in that behalf by the Postmaster-General, and the Postmaster-General may, by any such regulations, impose penalties recoverable summarily for the breach of any such regulations not exceeding ten pounds for each offence and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship. Save as aforesaid, nothing in this Act shall apply to the working of apparatus for wireless telegraphy installed on any foreign ship.

4. In the application of this Act to Scotland the expression "Misdemeanour" means crime and offence.

5. In the application of this Act to the Channel Islands and the Isle of Man:—

(1) The Lieutenant-Governor of the Island of Jersey or the Island of Guernsey, and the Governor, Lieutenant-Governor, or Deputy-Governor of the Isle of Man, as the case may require, shall be substituted for the Board of Trade.

(2) Offences may be prosecuted, fines recovered, proceedings taken, and search warrants issued in such courts and in such manner as may for the time being be provided in the Channel Islands and the Isle of Man by law, or, if no express provision is made then in and before the courts and in the manner in which the like offences, fines, proceedings, and warrants may be prosecuted, recovered, taken, or issued therein by law, or as near thereto as circumstances admit, and the bailiff or his lieutenant, or any jurat of the Royal Court in the Island of Jersey or the Island of Guernsey, and the judge or any jurat of the Court of Alderney, and the high bailiff or two justices of the peace in the Isle of Man, shall respectively be substituted for a justice of the peace.

6. This Act shall continue in force until the thirty-first day of July, nineteen hundred and six, and no longer unless Parliament otherwise determines. (It was renewed until December 31st, 1909, and has since been extended from year to year by the Expiring Laws Continuance Act.)

B The following Order in Council is dated February 29th, 1908:—

(1) The Wireless Telegraphy Act, 1904, shall apply to British ships whilst on the high seas, provided that a person on board a British ship which is registered in any British possession (other than the Channel Islands and the Isle of Man), or in any British Protectorate, shall not be deemed to commit an offence against the Wireless Telegraphy Act, 1904, by reason of the installation or working of wireless telegraphy on such ship if the authority in such Possession or Protectorate, having power by law so to do, shall have granted a licence for the installation and working of apparatus for wireless telegraphy on that ship, and if such person is acting in accordance with the provisions of such licence.

(2) The Interpretation Act, 1889, shall apply for the purpose of the interpretation of this

Order as it applies for the purpose of the interpretation of an Act of Parliament.

(3) This Order shall be published in the *London Gazette*, and shall come into operation immediately from and after the expiration of three months after this Order is so published.

(4) This Order may be cited as "The Wireless Telegraphy Order, 1908."

C An Order was issued in 1908 (No. 496) containing regulations relating to foreign ships:—

1. In these Regulations unless the context otherwise requires—

"Wireless Telegraphy" has the same meaning as in the Wireless Telegraphy Act, 1904.

"Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

"Territorial Waters" means such part of the sea adjacent to the coast of the British Islands as is deemed by international law to be within the territorial sovereignty of His Majesty, and includes harbours.

"Harbour" includes harbours properly so called, whether natural or artificial estuaries, navigable rivers, piers, jetties, and other works in or at which ships can obtain shelter, or ship and unship goods or passengers.

2. When communications are made by means of wireless telegraphy between a foreign ship in territorial waters and a wireless telegraph station in the British Isles, the rules in force for the working of wireless telegraphy at that station shall be observed.

3. All apparatus for wireless telegraphy on board a foreign ship in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(a) Naval Signalling, or

(b) the working of any wireless telegraph station lawfully established, installed, or worked in the British Islands or the territorial waters abutting on the coast of the British Islands, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. (1) Except with the special permission in writing of the Postmaster-General no apparatus for wireless telegraphy on board a foreign ship (other than a ship of war) shall be worked or used whilst such ship is in any harbour in the British Islands.

(2) Without prejudice to the operation of the general provisions of these Regulations, the use of wireless telegraphy on board a foreign ship of war while in a harbour in the British Islands shall be subject to such rules (whether prohibitive or regulative) as may be made by the Admiralty from time to time.

5. (1) If at any time in the opinion of one of His Majesty's Principal Secretaries of State an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, and notice to that effect is published by the Postmaster-General, after the publication of

such notice and until further notice the use of wireless telegraphy on board foreign ships whilst in territorial waters shall be subject to such rules as may be made by the Admiralty from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

(2) Such notice as aforesaid shall be published in the *London Gazette*, the *Edinburgh Gazette*, and the *Dublin Gazette*, and in such other manner, if any, as to the Postmaster-General may seem fit.

6. (1) Any person who shall offend against any provision of these Regulations or of any Rules made by the Admiralty thereunder shall be liable on conviction under the Summary Jurisdiction Acts for every such offence to a penalty not exceeding ten pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy installed or worked on board the ship on which the offence was committed shall be seized and forfeited.

(2) For the purposes of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any foreign ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(3) Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

7. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

8. These Regulations shall come into operation on the first day of July, 1908.

9. These Regulations may be cited as "The Wireless Telegraphy (Foreign Ships) Regulations, 1908."

D The following is a copy of the form of Licence granted by the Postmaster-General to establish Wireless Telegraph Ship Stations:—

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.*

To all to whom these presents shall come

I, The Right Honourable

His Majesty's Postmaster-General, send greeting:

Whereas by reason of the provisions of the Telegraph Acts 1863 to 1916 and the Wireless Telegraphy Order 1908 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship (whether in the territorial waters of the British Islands or on the high seas) except under and in accordance with a licence granted in that behalf by the Postmaster-General:

And whereas — (hereinafter called the licensee) has applied to the Postmaster-General for the grant of a licence to establish instal and work apparatus for wireless telegraphy as defined in Section 1 (7) of the Wireless Telegraphy Act 1904 at the ship station or stations mentioned in the Schedule hereto.

Now I the above-named — His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do

* This form of licence is no longer operative, and a new form is likely to be issued shortly.

hereby grant to the licensee during the term or period commencing on the day of the date hereof and continuing thereafter so long as the Defence of the Realm (Consolidation) Regulations 1914 shall remain in force licence and permission—

(i) To establish instal and work for the purposes hereinafter mentioned at the ship station or stations specified in the Schedule hereto apparatus for wireless telegraphy of the kind specified in the Schedule hereto (which apparatus is hereinafter referred to as "the licensed apparatus"):

Provided that—

(a) Each ship station shall be of such class mentioned in Article XIII of the Service Regulations annexed to the Radio-telegraph Convention 1912 as is specified in the said Schedule opposite to the name of such station:

(b) The apparatus installed at each ship station shall be of the character specified in the said Schedule opposite to the name of such station;

(c) The sending apparatus used at each ship station shall be of such a character that the waves emitted are as pure and as little damped as possible and the receiving apparatus used at the said station or stations shall be of such a character as to afford the greatest possible protection from disturbance during the reception of signals;

(d) The apparatus shall include such emergency installation as may be required according to the class of the ship station under the provisions of Article XI of the Service Regulations annexed to the Radio-telegraph Convention 1912, and such control switch as may be required by the Admiralty;

(e) The licensed apparatus shall be so constructed as to be capable of using wavelengths of 600 and 300 metres in length as measured by the standard of measurement in use by the Post Office for the time being and such other wavelengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Postmaster-General. Provided always that the wavelength of 600 metres shall normally be used for communication and further that the wavelength of 1,800 metres may be used for transmission in the exceptional case contemplated by Article XXXV (2) (a) of the Service Regulations annexed to the Radiotelegraph Convention 1912:

Provided further that only the wavelength of 600 metres (except as directed by the Admiralty) shall be used by the licensee during the period of any war in which the United Kingdom is engaged;

(f) The apparatus shall admit of the transmission and reception of messages at the rate of not less than 20 words a minute five letters being counted as one word;

(ii) To send and receive messages by means of the licensed apparatus between the said ship stations and also between the said ship stations and coast stations and other ship stations. Provided that the licensee shall not except with the consent in writing of the Postmaster-General send or receive messages from and at the said ship stations when in any harbour in the British Islands; and

(iii) To receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for in respect of the transmission or receipt of messages by means of the said apparatus.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions:

1. In these presents (and in the Schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say):—

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether a coast station or a ship station.

The expression "the Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

The expressions "the International Telegraph Convention" and "the International Telegraph Regulations" means respectively the International Convention of St. Petersburg dated the 10th 22nd July 1875 and the Service Regulations made thereunder and include respectively any modifications of the Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention 1912" means the Convention signed at London on the 5th day of July 1912 and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. On and after the day of 192 the installation and maintenance of each of the ship stations mentioned in the Schedule hereto by the licensee shall subject to the provisions of this licence be deemed compulsory in accordance with the provisions of Regulation 37B of the Defence of the Realm (Consolidation) Regulations 1914.

3. The licensed apparatus shall not be used by the licensee or by any other person either on behalf or by permission of the licensee for the despatch or receipt of messages except messages authorised by this licence.

4. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship station specified in the Schedule hereto is inconsistent with the free use of Naval signalling the licensee shall when required in writing by the Postmaster-General so to do close the said station.

(3) These provisions for the protection of Naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

5. For the purpose of this licence the licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

6. The licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 1916 by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business so far as the same are applicable to the licensee.

7. The licensee shall observe the provisions of the Radiotelegraph Convention 1912.

8. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Postmaster-General from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

9. The licensee shall comply in all respects with all such directions and regulations as may from time to time be given or made by the Admiralty.

10. The licensed apparatus shall not without the consent of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule thereto.

11. The licensee shall at all times indemnify the Postmaster-General against all actions claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

12. (1) Subject to the provisions of this licence the licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or preference whether as regards rates of charge order of transmission or otherwise. Provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

(2) In respect of messages transmitted on behalf of His Majesty's Government or the Government of any British Possession or Protectorate the licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

13. The licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

14. (1) The licensed apparatus at each of the ship stations mentioned in the Schedule thereto shall be worked only by operators holding certificates issued by the Postmaster-General and the licensee shall provide for the working of each station at least two such operators.

(2) Certificates will be granted to persons of

such technical proficiency and will be in such form and will be subject to such conditions as the Postmaster-General shall from time to time prescribe and they may be endorsed or withdrawn at the discretion of the Postmaster-General in accordance with the conditions to which the certificates are respectively subject.

15. The licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus. The licensee shall exhibit at each of the ship stations specified in the Schedule hereto a copy of Section 11 of the Post Office (Protection) Act 1884 and any contravention of that section by any person in the employment of the licensee shall be deemed to be a breach of the provisions of this licence.

16. The licensee shall keep full accounts records and registers of all messages transmitted by means of the licensed apparatus and in such registers each of such message shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Postmaster-General shall from time to time reasonably require to be shown messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least fifteen months counting from the month following that in which the radiotelegrams were handed in as prescribed by the Radiotelegraph Convention 1912 and such registers and message papers shall be open to the inspection of the Postmaster-General or his officers thereto authorised at the registered office of the licensee for the time being or at such other place as may be agreed between the hours of 10 a.m. and 5 p.m. on every day except Sunday or a statute or general holiday.

17. The licensee shall render to the Postmaster-General such accounts as the Postmaster-General shall direct in respect of all charges due or payable under the Radiotelegraph Convention 1912 in respect of messages exchanged between the ship stations hereby licensed and coast stations and shall pay to the Postmaster-General at such times and in such manner as the Postmaster-General shall direct all sums which shall be due from the licensee under such accounts.

18. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations hereby licensed for the purpose of inspecting and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the working and use of such apparatus and telegraphic instruments respectively.

19. The licensee shall carry on every ship on which a ship station is established under this licence a print or copy of the licence certified under the hand of an appropriate officer of the Postmaster-General to be a true copy and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls. The licensee shall also carry on every

such ship such documents as may be prescribed by the Postmaster-General for the purpose of enabling the licensee to communicate with coast stations and ship stations in accordance with the Radiotelegraph Convention 1912.

20. (1) The licensee shall pay to the Postmaster-General for and in respect of the licence hereby granted a royalty of five shillings per annum in respect of each ship station at which the licensed apparatus is installed.

(2) The said royalty shall be payable on December 1st in each year during which the licence remains valid.

21. Except with the consent in writing of the Postmaster-General the licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

22. (1) Inasmuch as an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for any Naval Military Customs or Police Officer or any other person authorised by the Admiralty to take possession of the licensed apparatus or any part thereof in the name and on behalf of His Majesty and to use the same for His Majesty's service and any such officer or person so authorised may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid and subject to such use may use the same or allow it to be used for such ordinary services as may in his discretion seem fit to him or may prohibit and take steps to prevent the use of the same and issue directions which shall be obeyed by the licensee to prevent such use.

(2) Any such officer or person so authorised as aforesaid may instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct and such persons may enter upon any ship on which any apparatus is installed accordingly or the said officer or person so authorised as aforesaid may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to

obey all such directions with reference to the transmission of messages as the said officer or person so authorised as aforesaid may prescribe and the licensee shall obey and conform to all such directions.

(3) The licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

23. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in the licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

24. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any one of the Secretaries or Assistant Secretaries for the time being of the Post Office and may be served by sending the same in a registered letter addressed to the licensee at the registered office for the time being of the licensee or if such notice request or consent relates to any particular ship station by delivery to the master of the ship upon which such station is installed and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office London.

As witness my hand and seal this
day of one thousand nine hundred
and

Signed sealed and delivered by

On behalf of the Postmaster-General in the
presence of

THE SCHEDULE OF SHIP STATIONS BEFORE REFERRED TO

(1)	(2)	(3)	(4)	Normal Range of Signalling in Nautical Miles.		Character of Apparatus.		Qualification of Operator.	Power.		(11)
				By Night.	By Day.	System of Radiotelegraphy with the Characteristics of the System of Emission.	Wavelengths (in Metres).		Source and Maximum Output.	Maximum to be taken by Sending Instruments.	
				(5)	(6)	(7)	(8)	(9) <i>See</i> Clause 14 of the Licence.	(10)		
							600 and 300				

LICENCE TO USE WIRELESS TELEGRAPHY FOR PRIVATE BUSINESS.*

Whereas
E of _____ in the county of _____ (hereinafter called "the licensee") is desirous of establishing installing working and using a system of wireless telegraphy as defined in Section 1 (7) of the Wireless Telegraphy Act 1904 :

And whereas by reason of the provisions of the Telegraph Acts 1863 to 19 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place except under and in accordance with a licence granted in that behalf by the Postmaster-General and it is also unlawful save as in the said Acts provided to transmit telegrams within the United Kingdom :

And where as at the request of the licensee I have agreed to grant to the licensee the licences powers and authorities hereinafter expressed and contained for the period upon the terms and subject to the stipulations and conditions hereinafter appearing :

Now I the above-named His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do hereby grant to the licensee during the term or period commencing on the day of the date hereof and terminating on the 31st day of December 19 _____ licence and permission—

(i) to establish and instal work at the stations specified in the Schedule hereto apparatus for wireless telegraphy (hereinafter called "the licensed apparatus") provided that the apparatus installed at each station shall be of the character specified in the said Schedule opposite to the name of such station ; and

(ii) to transmit and receive messages on the private business of the licensee by means of the licensed apparatus between the said stations.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions :

1. In these presents (and in the schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say) —

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

The expression "the Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

* The terms of this licence are no longer operative, and a new form of licence is likely to be issued shortly.

Apparatus shall be deemed to be "syn-tonised" when the transmitting apparatus is so adjusted as to communicate with a receiver which has a corresponding adjustment and to produce as little effect as possible on a receiver not having a corresponding adjustment.

2. (1) The licensed apparatus shall not be used by the licensee or by any person either on behalf or by permission of the licensee for any purpose except for the transmission and receipt of such messages as aforesaid between and at the stations specified in the Schedule hereto.

(2) No money or other valuable consideration shall be received by the licensee or by any other person with the authority or by the permission of the licensee in respect of the transmission or receipt of any messages by means of the licensed apparatus or any part thereof.

3. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with naval signalling.

(2) Whenever the operators at any signal station of the licensee perceive through the medium of the instruments used by them that naval signalling is proceeding they shall refrain from using the licensed apparatus until all indication that naval signalling is proceeding shall have ceased.

(3) The licensee shall if so required in writing by the Admiralty cease to use the licensed apparatus for such period (not exceeding two hours in any one day) as may be specified by the Admiralty.

(4) If the Admiralty are of opinion that the working of the licensed apparatus at any station specified in the Schedule hereto is inconsistent with the free use of naval signalling the licensee shall when required in writing by the Postmaster-General close the said station.

(5) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. The licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 19 _____ by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business.

5. (1) The licensee shall so work the licensed apparatus as not to interfere with the working of any wireless telegraph station established in the British Islands or the territorial waters abutting on the coasts of the British Islands (whether on shore or on any ship) by or for the purposes of the Postmaster-General or any department of His Majesty's Government or for commercial purposes and in particular with the transmission or receipt of any messages between or at wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) With a view to preventing such interference as aforesaid the licensee shall comply with all directions which shall be given to the licensee by the Postmaster-General and with all rules prescribed by the Postmaster-General for observance by his licensees—

(a) With respect to all arrangements to be adopted for the purpose of securing syntonised apparatus or for enabling the

messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station;

(b) With respect to any alteration of messages which the Postmaster-General may think necessary; and

(c) Generally with respect to avoiding interference between one wireless telegraph station and another.

6. The licensee apparatus shall not without the consent in writing of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

7. The licensee shall at all times indemnify the Postmaster-General against all actions, claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

8. The licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

9. Subject to the provisions of this licence the licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus.

10. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the stations or other premises in the possession or occupation of the licensee either solely or jointly with any other person or persons for the purpose of inspecting and may inspect any apparatus fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such places respectively, and the working and use of such apparatus and telegraphic instruments respectively.

11. (1) All apparatus used or intended to be used by the licensee shall be so erected fixed placed and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance working or user of any telegraphic line of the Postmaster-General which may from time to time exist or which it is probable that the Postmaster-General may have occasion to erect place fix or use or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or user thereof.

(2) In case any telegraphic line of the Postmaster-General shall be damaged or the efficient working or user thereof shall be wholly or partially interrupted or otherwise interfered with and the Engineer-in-Chief for the time being of the Post Office shall certify in writing under his hand that such damage interruption or interference has been caused directly or indirectly by any apparatus used or intended to be used by the licensee or by anything done by or on behalf of the licensee in relation thereto the licensee shall on demand pay to the Postmaster-General all

costs that shall be reasonably incurred by him in repairing such damage and in removing or altering such telegraphic line so as to restore the same to efficient working order and in adding thereto or substituting therefor either temporarily or permanently any other telegraphic line if the said Engineer-in-Chief shall certify that such addition or substitution is reasonably required.

(3) For the purposes of this Article the expression "telegraphic line" has the same meaning as in the Telegraph Act 1878 and the expression "telegraphic line of the Postmaster-General" includes a telegraphic line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Government or other body or person.

12. (1) The licensee shall pay to the Postmaster-General on the 1st day of December next for and in respect of the licence hereby granted a royalty of £ per annum in respect of each station.

(2) In the event of the renewal of this licence the said royalty shall be payable on the same day in each succeeding year.

13. Except with the consent in writing of the Postmaster-General the licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

14. If and whenever in the opinion of one of His Majesty's Principal Secretaries of State an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the said Secretary of State by warrant under his hand to direct and cause the licensed apparatus or any part hereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and in that event any person authorised by the said Secretary of State may enter upon the stations offices and works of the licensee or any of them and take possession thereof and use the same as aforesaid.

15. The Postmaster-General may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby given at the end of one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Postmaster-General under any condition or provision herein contained.

16. In any of the following cases (that is to say) —

(a) In case any sum of money which ought to be paid by the licensee to the Postmaster-General under or by virtue of these presents shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained; or

(b) In case of any breach non-observance or non-performance by or on the part of the licensee of any of the provisions (other than a provision for the payment of money) or conditions herein contained;

then and in any such case the Postmaster-General may by writing under his seal revoke and determine these presents and the

powers and authorities hereinbefore granted and each and every of them and thereupon these presents and the said licences powers and authorities and each and every of them shall absolutely cease determine and become void.

Provided always that no such revocation or determination as aforesaid shall prejudice or affect any right of action or remedy which shall have accrued or shall thereafter accrue to the Postmaster-General under any condition or provision herein contained.

17. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature or those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit and (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

18. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any one of the Secretaries or Assistant Secretaries for the time being of the Post Office, and may be served by sending the same in a registered letter addressed to the licensee at the usual or last known place of residence or business of the licensee, and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office, London.

F In October, 1912, the Board of Trade, at the request of the Lords Commissioners of the Admiralty, issued a notice directing the attention of Masters and Owners of British Merchant Vessels to the necessity for arranging for periodical practices in Wireless Telegraphy communications between H.M. Ships of War and Ships of the British Mercantile Marine for

the purpose of ensuring efficient and reliable communication when required.

The co-operation is invited of all British shipowners and masters whose ships are fitted with wireless telegraphy, in order to give effect to the following proposals:—

(1) At 8.30 a.m. and 2.30 p.m. daily any single man of war (destroyers and small craft excluded) or one man-of-war in a fleet in company, detailed by the Senior Naval Officer present, will adjust her wireless telegraphy transmitting and receiving apparatus to the commercial 600 metre wavelength and make the call "CCCC," followed by her own commercial call sign, indicating that she is prepared to carry out an exercise with any British merchant ship within range.

On a British merchant ship receiving this call she will answer and say whether or not she is prepared to proceed with the exercise. Should more than one merchant ship answer, the man-of-war will indicate which is to exercise and which is to wait.

The exercise will then proceed, but no messages are to be exchanged which are not authorised by the respective captains and masters of the ships practising. No message received during such exercises is to be forwarded beyond the ship actually receiving the message and no payment for any message can be made. The exercises are to be considered as strictly on Service and not for any commercial advantage.

(2) In all such exercises the man-of-war is to be considered the controlling ship.

(3) The exercises will cease at 9.15 a.m. and 3.15 p.m. respectively, or before, at the discretion of the captains concerned.

(4) These exercises are only to be carried out between vessels neither of which is within 150 miles range of any commercial shore station using the 600 metre wavelength, and are to cease at once should one of H.M. ships so direct.

MERCHANT SHIPPING (CONVENTION) ACT, 1914.

G An Act to make amendments of the law relating to Merchant Shipping as are necessary or expedient to give effect to an International Convention for the Safety of Life at Sea, signed in London on January the twentieth, nineteen hundred and fourteen, and for purposes incidental thereto. (August 10th, 1914.)

PART III.

(Which deals with Wireless Telegraphy.)

15. (1) Subject to the provisions of this Act every British ship registered in the United

THE SCHEDULE.

Name of Station.	Normal Range of Signalling.		Character of Apparatus.		Power.		If Alternator is used, No. of Cycles per Second.
	By Night.	By Day.	Description of Receiving Apparatus.	Wave-lengths (in Metres).	Source and Maximum Output.	Maximum to be taken by Transmitting Instruments.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Kingdom which carries 50 or more persons shall be provided with a wireless telegraphy installation, and shall maintain a wireless telegraphy service which shall be at least sufficient to comply with the rules made for the purpose under this Act, and shall be provided with certified operators and watchers at least in accordance with those rules. Provided that the obligations imposed by this section shall not come into operation until such date, not being less than six months after the making of those rules, as may be specified in the rules.

(2) In reckoning the number of persons carried on a ship for the purpose of this section, persons shall not be counted who are exceptionally and temporarily carried on a ship—

(a) As the result of *force majeure*; or
(b) as the result of the necessity of increasing the number of the crew to fill the places of members of the crew who are ill or disabled; or

(c) as the result of the obligation on the part of the master to carry shipwrecked persons, or persons in like circumstances; or,

(d) if so provided by rules of the Board of Trade, as cargo hands for a part of the voyage not being between one continent and another and not being, during the time the hands are carried, outside the limits of latitude thirty degrees north and thirty degrees south.

(3) If this section is not complied with in the case of any ship, the master or owner of the ship shall be liable in respect of each offence to a fine not exceeding five hundred pounds, and any such offence may be prosecuted summarily, but if the offence is prosecuted summarily the fine shall not exceed one hundred pounds.

16. (1) The Board of Trade, in consultation with the Postmaster-General, shall make such rules with respect to wireless telegraphy installations and service on British ships which are registered in the United Kingdom and with respect to the carrying on those ships of operators and watchers for the purposes of wireless telegraphy, as appear to them necessary or expedient to carry into effect the provisions of the Convention mentioned in Part V of the Third Schedule to this Act.

(2) The Board of Trade may by rules made under this section exempt from the obligations of this Act as to wireless telegraphy—

(a) Ships while on voyages the course of which does not take the ship more than a hundred and fifty sea miles from the nearest coast, if the Board are satisfied that the route and the conditions of the voyage are such as to render compliance with those obligations unreasonable or unnecessary; and,

(b) sailing ships on which owing to the peculiar or primitive nature of their build, it is impossible to provide a proper wireless telegraphy installation.

(3) The Board of Trade may by rules made under this section provide that any automatic calling apparatus which is certified by them to be efficient and to have been accepted by the parties to the Convention may be substituted, for the purposes of the provisions of this Act and any rules made thereunder relating to wireless telegraphy, for a certified operator or watcher.

17. The Board of Trade may postpone the operation of the provisions of this Act relating to wireless telegraphy as respects any particular

ship for such period as the Board of Trade determine in each case, if it is shown by the owners of the ship that they have taken all reasonable steps to comply with the provisions of this Act as respects the ships, but that they have been unable to do so owing to difficulties in obtaining delivery of any wireless telegraphy apparatus or of obtaining the service of certificated operators or watchers.

The period of postponement under this section shall not exceed one year in the case of ships which are required in pursuance of the Convention to provide a first-class wireless telegraphy service, and two years in the case of ships which are so required to provide a third-class wireless telegraphy service, and in the case of ships which are so required to provide a second-class wireless telegraphy service, shall not exceed one year as respects the provision of a wireless telegraphy installation and two years as respects the provision of a continuous watch.

EXTRACT FROM THE DEFENCE OF THE REALM (CONSOLIDATION) REGULATIONS, 1914.

22. No person shall, without the written permission of the Postmaster-General, make, buy, sell, or have in his possession, or under his control, any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus; and no person shall sell any such apparatus to any person who has not obtained such permission as aforesaid, and any person having in his possession or under his control any such apparatus, whether with or without the permission of the Postmaster-General, shall on demand deliver the apparatus to the Postmaster-General, or as he may direct; and if any person contravenes the provisions of this regulation he shall be guilty of an offence against these regulations.

If the competent naval or military authority has reason to suspect that any person having in his possession any apparatus for sending or receiving messages by telegraphy, wireless telegraphy, telephony, or other electrical or mechanical means is using, or about to use, the same for any purpose prejudicial to the public safety or the defence of the realm, he may, by order, prohibit that person from having any such apparatus in his possession, and may take such steps as are necessary for enforcing the Order, and if that person subsequently has in his possession any apparatus in contravention of the Order he shall be guilty of an offence against these regulations.

For the purposes of this regulation any apparatus ordinarily used as a distinctive component part of apparatus for the sending or receiving of messages by wireless telegraphy shall be deemed to be intended to be so used unless the contrary is proved.

I EXTRACTS FROM SUPPLEMENT TO THE LONDON GAZETTE OF TUESDAY, THE 29TH OF APRIL, 1919.

Wednesday, 30th April, 1919.

Air Ministry.

AIR NAVIGATION REGULATIONS, 1919.
ORDER OF THE SECRETARY OF STATE UNDER THE AIR NAVIGATION ACTS, 1911 TO 1919.

In pursuance of the powers conferred upon me by the Air Navigation Acts, 1911 to 1919,

and all other powers enabling me in that behalf, I, the Right Honourable Winston Spencer Churchill, one of His Majesty's Principal Secretaries of State, by order make the following regulations:—

GENERAL CONDITIONS OF FLYING.

1. No aircraft shall fly within the limits of the British Islands and the territorial waters adjacent thereto unless the following conditions are complied with:—

(6) No mails shall be carried without the consent in writing of the Postmaster-General and no wireless apparatus shall be installed or worked except under and in accordance with a licence granted by the Postmaster-General, containing such conditions as may be approved by the Secretary of State:

PRODUCTION OF LICENCES, CERTIFICATES AND LOG-BOOKS FOR INSPECTION.

6. (1) Any member of the personnel of an aircraft shall on demand produce his licence for the inspection of any person authorised for the purpose by the Secretary of State.

(2) The owner and person in charge of any aircraft shall, on demand, produce for the inspection of any person authorised for the purpose by the Secretary of State, any certificates or licences relating to the aircraft, and also, in the case of passenger or goods aircraft, any of the prescribed log-books.

EXCEPTIONS.

8. These regulations do not, except where otherwise expressly stated, apply—

(a) to military aircraft belonging to or employed in the service of His Majesty; or

(b) to any aircraft or to any persons if and to such extent as such aircraft or persons may be excepted from these regulations, or any of them, by direction of the Secretary of State on the recommendation of a Government Department.

PENALTIES.

10. (1) Where any aircraft flies in contravention of, or fails to comply with, these regulations or any provision thereof, the owner of the aircraft, and also the pilot or commander, shall be deemed to have contravened, or, as the case may be, failed to comply with these regulations:

Provided that it shall be a good defence to any proceedings for contravention or failure to comply with these regulations if the contravention or failure is proved to have been due to stress of weather or other unavoidable cause.

(2) If any person obstructs or impedes any person acting under the authority of the Secretary of State in the exercise of his powers and duties under these regulations, such first-mentioned person shall be deemed to have acted in contravention of these regulations.

(3) Any person contravening or failing to comply with these regulations or any provision thereof is liable to imprisonment for a term not exceeding six months or to a fine not exceeding two hundred pounds, or to both such imprisonment and fine.

(5) If any person in any aircraft is guilty of any act of espionage to which the provisions of section one of the Official Secrets Act, 1911, apply, he is liable to penal servitude for a term not exceeding seven years.

INTERPRETATION.

12. In these regulations, unless the context otherwise requires—

"Aircraft" includes airships and flying machines, all balloons, whether fixed or free, and kites;

"Military aircraft" includes naval, military, and air-force aircraft;

"Personnel" (in relation to any aircraft) includes any pilot, commander, navigator, and engineer, and any operative member of the crew;

The Interpretation Act, 1889, applies for the purpose of the interpretation of these regulations as it applies for the purpose of the interpretation of an Act of Parliament, and as if these regulations were an Act of Parliament.

SHORT TITLE.

14. These regulations may be cited as the Air Navigation Regulations, 1919.

WINSTON S. CHURCHILL,

One of His Majesty's Principal Secretaries of State.

Air Ministry, London,
30th April, 1919.

J CIRCULAR TO OWNERS AND MASTERS OF BRITISH MERCHANT SHIPS.

WIRELESS TELEGRAPHY IN MERCHANT SHIPS — RELAXATION OF RESTRICTIONS.

II. Restrictions on Use of Wireless Telegraphy.

1. All restrictions on the use of wireless telegraphy in ships are removed, except in the following waters:—

Baltic.

Black Sea and Sea of Marmora.

2. In the above waters wireless telegraphy communications are permitted as follows:—

(i) Between masters and owners on matters concerning the safety and working of the ship.

(ii) Between masters and naval authorities. Messages must be in code. A special code is supplied for this.

(iii) Official messages from accredited Ministers or Officials of H.M. Governments, or Officers of the Naval or Military Forces travelling in their official capacities as passengers on board, to Government departments, or Naval or Military authorities on shore. Should such officials require to send messages of any other description, they should be shown these instructions as constituting the Master's authority for refusing to have messages despatched.

(iv) Private telegrams are forbidden.

It should be borne in mind that stations belonging to foreign Governments are not yet all open to public correspondence.

3. In order to avoid delay in making distress signals whilst in the above waters the Master is responsible that the wireless telegraphy office is informed whenever the vessel enters any of these zones. Whilst in these zones the operator is to be kept supplied, while on watch, with the position of the vessel. This is to be communicated to the operator in writing, and is to be corrected every half-hour.

4. Outside the waters named in par. 1 private messages are admitted.

Note.—Owners wishing to divert their ships by wireless should now send the necessary

message direct, and not through the Director Mercantile Movements as heretofore.

This Circular cancels and replaces Section XXXII of "Admiralty Instructions for British Merchant Ships" (Addendum of 25th August, 1919, and Circular of 31st July, 1919).

Naval Staff,
Admiralty,
Nov. 22nd, 1919.

K MERCHANT SHIPPING (WIRELESS TELEGRAPHY) ACT, 1919. CHAPTER 38.

AN ACT TO MAKE FURTHER PROVISION WITH RESPECT TO WIRELESS TELEGRAPHY ON SHIPS.

August 15th, 1919.

Be it enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. (1) Every sea-going British ship registered in the United Kingdom being a passenger steamer or a ship of sixteen hundred tons gross tonnage or upwards shall be provided with a wireless telegraph installation, and shall maintain a wireless telegraph service which shall be at least sufficient to comply with the rules made for the purpose under this Act, and shall be provided with one or more certified operators and watchers, at least in accordance with those rules:

Provided that the Board of Trade may exempt from the obligations imposed by this Act any ships or classes of ships if they are of opinion that, having regard to the nature of the voyages on which the ships are engaged, or other circumstances of the case, the provision of a wireless telegraph apparatus is unnecessary or unreasonable.

(2) The Board of Trade, in consultation with the Postmaster-General, shall make rules prescribing the nature of the wireless telegraph installation to be provided, of the services to be maintained, and the number, grade, and qualifications of operators and watchers to be carried:

Provided that no ship shall be required to carry more than one operator unless more than one operator would have been required under the provisions of the Merchant Shipping (Convention) Act, 1914.

(3) If this section is not complied with in the case of any ship, the master or owner of the ship shall be liable in respect of each offence to a fine not exceeding five hundred pounds, and any such offence may be prosecuted summarily, but if the offence is prosecuted summarily, the fine shall not exceed one hundred pounds.

(4) A surveyor of ships or a wireless telegraphy inspector may inspect any ship for the purpose of seeing that she is properly provided with a wireless telegraph installation and certified operators and watchers in conformity with this Act, and for the purpose of that inspection shall have all the powers of a Board of Trade inspector under the Merchant Shipping Acts, 1894 to 1916.

If the said surveyor or inspector finds that the ship is not so provided, he shall give to the master or owner notice in writing pointing out the deficiency, and also pointing out what in his opinion is requisite to remedy the same.

Every notice so given shall be communicated in the manner directed by the Board of Trade to the chief officer of customs of any port at which the ship may seek to obtain a clearance or transire, and the ship shall be detained until a certificate under the hand of any such surveyor or inspector is produced to the effect that the ship is properly provided with wireless telegraph installation and certified operators and watchers in conformity with this Act.

(5) The obligations imposed by this Act shall not come into operation while the obligations with respect to wireless telegraphy on ships imposed by the Defence of the Realm Regulations remain in force, but shall be in addition to, and not in substitution for, the obligations as to wireless telegraphy imposed by the Wireless Telegraphy Act, 1904, or any Order in Council, or regulations made thereunder, or by the Merchant Shipping (Convention) Act, 1914.

2. The foregoing provisions of this Act shall, as from a date three months after the coming into operation of the obligations imposed by this Act on British ships registered in the United Kingdom, apply to ships other than British ships registered in the United Kingdom while they are within any port in the United Kingdom in like manner as they apply to British ships so registered.

3. (1) This Act may be cited as the Merchant Shipping (Wireless Telegraphy) Act, 1919, and the Merchant Shipping Acts, 1894 to 1916, and this Act may be cited together as the Merchant Shipping Acts, 1894 to 1919.

(2) This Act shall be construed as one with the Merchant Shipping Act, 1894, and "passenger steamer" shall mean a steamer which carries more than twelve passengers, and "wireless telegraphy inspector" means an officer appointed under section twenty of the Merchant Shipping (Convention) Act, 1914, for the purposes therein mentioned.

THE MERCHANT SHIPPING (WIRELESS TELEGRAPHY) RULES, 1920.
DATED JULY 10th, 1920.
L MADE BY THE BOARD OF TRADE UNDER THE MERCHANT SHIPPING (WIRELESS TELEGRAPHY) ACT, 1919 (9 & 10 GEO. 5, C. 38).

The Board of Trade hereby make the following rules under the provisions of the Merchant Shipping (Wireless Telegraphy) Act, 1919.

Dated this tenth day of July, 1920.

H. A. PAYNE,
Secretary to the Board of Trade.

INTERPRETATION.

1. In these Rules—

The expression "coasting trade" means trade exclusively carried on between ports in the British Islands.

The number of hours occupied in a voyage from port to port means the normal number of hours occupied in a voyage between one port of call and the next.

CLASSIFICATION OF SHIPS.

2. For the purposes of these Rules ships shall be classified as follows:—

Class I—Ships carrying 200 persons or more which are not engaged in the coasting trade.

Class II—Ships not engaged in the coasting trade carrying 50 but less than 200 persons and ships engaged in the coasting trade carrying 50 persons or more.

Class III—Ships carrying less than 50 persons. In reckoning the number of persons carried by a ship there shall be included the normal crew of the ship and the maximum number of passengers permitted to be carried by the passenger certificate of the ship.

NATURE OF INSTALLATION.

3. The installation shall comply with the requirements of the International Radiotelegraph Convention, 1912, as modified by any other international agreement (and in particular the International Convention of Safety of Life at Sea, 1914), or of any international agreement by which the said Convention of 1912 may be superseded.

4. The installation shall be of the spark or interrupted continuous wave type.

5. (1). The installation shall include a normal installation and an emergency installation, except that where the normal installation complies with the requirements of this rule as to emergency installations as well as those as to normal installations a normal installation alone shall suffice.

(2) A normal installation must be capable of transmitting clearly perceptible signals from ship to ship over a range of at least 100 nautical miles by day under normal condition and circumstances.

(3) An emergency installation must include an independent source of energy capable of being put into operation rapidly and of working for at least six continuous hours with a minimum range from ship to ship of 80 nautical miles for ships of Class I, and 50 nautical miles for ships of Classes II and III, and such independent source of energy must be capable of being worked for at least six continuous hours independently from the source of propelling power for the ship, the steam supply system and the main electricity supply system.

(4) For the purposes of this rule an installation shall be deemed to comply with the above requirements as to range if it is able to maintain communication on a 600 metre wave at a range of one-and-a-half times the number of nautical miles hereinbefore respectively prescribed over sea by day with a Post Office Standard Station when employing a receiver without amplification devices.

6. There shall be provided between the bridge and the wireless telegraph room means of communication by voice pipe, telephone or other means and an operator or watcher when on duty shall not leave the wireless telegraph room to deliver messages or to call his relief.

SHIPS NOT FITTED WITH APPROVED AUTOMATIC APPARATUS.

7. If not fitted with an approved automatic apparatus for registering the signal of distress—

(i) A ship of Class I shall carry certificated operators in accordance with the following table, and while at sea a certificated operator shall be always on watch:—

NATURE OF VOYAGE.	NUMBER AND GRADE OF OPERATORS.
(a) Voyage exceeding 48 hours from port to port.	Three operators, of whom one shall hold a First Grade Certificate, and not more than one a Third Grade Certificate.
(b) Voyage exceeding 8 hours but not exceeding 48 hours from port to port.	Two operators of whom one shall hold a First or a Second Grade certificate.
(c) Voyage not exceeding 8 hours from port to port.	One operator who shall hold a First or a Second Grade certificate.

(ii) A ship of Class II shall carry certificated operators and certificated watchers in accordance with the following table, and while at sea a certificated operator shall always be on watch at the times specified in the Schedule to these Rules, and either a certificated operator or a certificated watcher shall always be on watch at other times.

NATURE OF VOYAGE.	NUMBER AND GRADE OF OPERATORS AND WATCHERS.
(a) Voyage exceeding 48 hours from port to port.	One operator who shall hold a First or a Second Grade certificate, and two watchers.
(b) Voyage exceeding 8 hours but not exceeding 48 hours from port to port.	One operator who shall hold a First or a Second Grade certificate, and one watcher.
(c) Voyage not exceeding 8 hours from port to port.	One operator who shall hold a First or a Second Grade certificate.

(iii) A ship of Class III shall carry one operator who shall hold a First or a Second Grade certificate, and while at sea the operator shall always be on watch at the times specified in the Schedule to these Rules.

SHIPS FITTED WITH APPROVED AUTOMATIC APPARATUS.

8. In the event of an automatic apparatus for registering the signal of distress being approved by the Board of Trade and the Postmaster-General a ship of Class III shall be fitted with such apparatus unless the duration of the voyage on which it is employed does not exceed eight hours from port to port, but in such a case the operator shall be on watch during the whole time of the voyage.

9. If fitted with automatic apparatus for registering the signal of distress approved as aforesaid:—

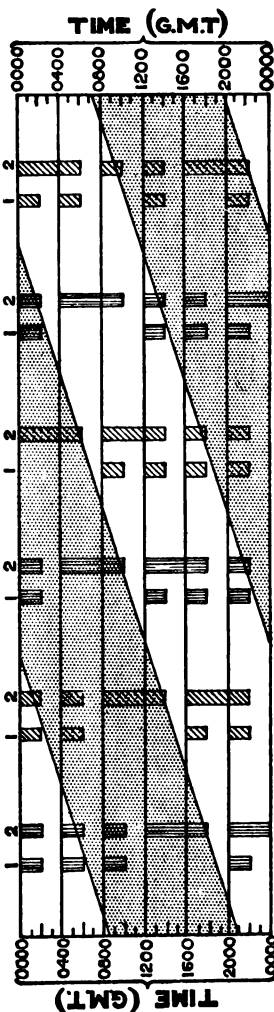
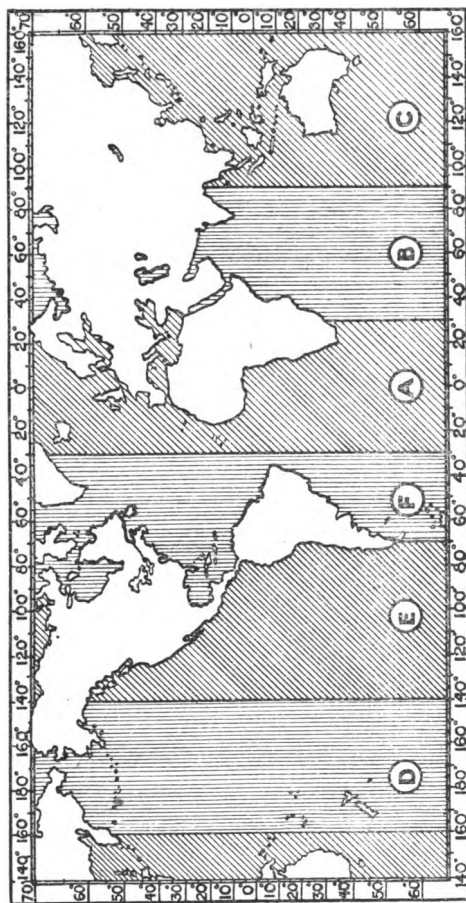
(i) A ship of Class I shall carry certificated operators in accordance with the following table and while at sea a certificated operator shall always be on watch during the times specified in the Schedule to these Rules, and a watch shall be maintained at all other times either by a certificated operator, or by a watcher, or by means of the approved automatic apparatus:—

NATURE OF VOYAGE.	NUMBER AND GRADE OF OPERATORS.
(a) Voyage exceeding 48 hours from port to port.	Two operators, one of whom shall hold a First Grade certificate.
(b) Voyage not exceeding 48 hours from port to port.	One operator who shall hold a First or a Second Grade certificate.

(ii) A ship of Class II shall carry one operator who shall hold a First or a Second Grade certificate, and while at sea the operator shall be on watch during the times specified in the Schedule to these Rules, and a watch shall be maintained at all other times either by an operator, or by a watcher, or by means of the approved automatic apparatus.

(iii) A ship of Class III shall carry one operator who shall hold a First or a Second Grade certificate, and while at sea the operator shall be on watch during the times specified in the Schedule to these Rules, and a watch shall be maintained at all other times either by an operator, or by a watcher, or by means of the approved automatic apparatus.

Provided that if a ship of Class III is fitted with an automatic apparatus for registering the signal of distress and with an automatic



apparatus for registering the ship's own distinguishing signal, both of which have been approved by the Board of Trade and the Postmaster-General, the operator shall not, while the ship is more than 150 nautical miles from any coast station, be required to be on watch at the times specified in the Schedule to these Rules.

QUALIFICATIONS OF OPERATORS.

10. (1) Operators shall be graded into three grades in accordance with Rules to be made by the Postmaster-General with the concurrence of the Board of Trade and watchers shall be certificated by the Postmaster-General.

(2) Until graded in accordance with such Rules as aforesaid:—

(i) An operator who holds the Postmaster-General's First Class certificate of Proficiency and who has had three years' experience as an operator may be employed as if he held a First Grade certificate, but if an operator holding a First Grade certificate is available an operator holding a First Class certificate shall not be so employed on a ship of Class I which is required by these Rules to carry three operators.

(ii) An operator who holds the Postmaster-General's First or Second Class certificate of Proficiency and who has had one year's experience as an operator may be employed as if he held a Second Grade certificate.

(iii) An operator who holds the Postmaster-General's First or Second Class certificate of Proficiency and who has had less than one year's experience as an operator may be employed as if he held a Third Grade certificate.

11. The Postmaster-General may accept certificates granted to operators by the Govern-

ment of any part of His Majesty's Dominions or of a foreign country in pursuance of the regulations annexed to any International Radiotelegraph Convention for the time being in force.

12. These Rules shall come into operation on the 1st day of September, 1920.

Schedule.

TIMES OF WATCH FOR SHIPS REQUIRED TO CARRY ONE OR TWO OPERATORS.

Zones.	Western Limit.	Eastern Limit.	Times of Watch for One Operator, Greenwich Mean Time.	Times of Watch for Two Operators, Greenwich Mean Time.
A. Eastern Atlantic, Mediterranean, North Sea, Baltic, Western Arctic Sea.	Meridian of 30° W., Coast of Greenland.	Meridian of 30° E. to the South of the Coast of Africa. Eastern limit of Mediterranean, Black Sea, and of the Baltic, 30° E. to the North of Coast of Norway.	from 8 h. to 10 h. 12 h. „ 14 h. 16 h. „ 18 h. 20 h. „ 22 h.	from 0 h. to 6 h. 8 h. „ 14 h. 16 h. „ 18 h. 20 h. „ 22 h.
B. Indian Ocean, Eastern Arctic Sea.	Eastern Limit of Zone A	Meridian of 90° East	from 0 h. to 2 h. 12 h. „ 14 h. 16 h. „ 18 h. 20 h. „ 22 h.	from 0 h. to 2 h. 4 h. „ 10 h. 12 h. „ 14 h. 16 h. „ 18 h. 20 h. „ 24 h.
C. China Sea, Western Pacific Ocean.	Eastern Limit of Zone B.	Meridian of 160° E.	from 0 h. to 2 h. 4 h. „ 6 h. 12 h. „ 14 h. 20 h. „ 22 h.	from 0 h. to 6 h. 8 h. „ 10 h. 12 h. „ 14 h. 16 h. „ 22 h.
D. Central Pacific Ocean.	Eastern Limit of Zone C.	Meridian of 140° W	from 0 h. to 2 h. 4 h. „ 6 h. 8 h. „ 10 h. 20 h. „ 22 h.	from 0 h. to 2 h. 4 h. „ 6 h. 8 h. „ 10 h. 12 h. „ 18 h. 20 h. „ 24 h.
E. Eastern Pacific Ocean.	Eastern Limit of Zone D.	Meridian of 70° W. South of the Coast of America, West Coast of America.	from 0 h. to 2 h. 4 h. „ 6 h. 16 h. „ 18 h. 20 h. „ 22 h.	from 0 h. to 2 h. 4 h. „ 6 h. 6 h. „ 14 h. 16 h. „ 22 h.
F. Western Atlantic Ocean and Gulf of Mexico.	Meridian of 70° W. South of the Coast of America, East Coast of America.	Meridian of 30° W., Coast of Greenland.	from 0 h. to 2 h. 12 h. „ 14 h. 16 h. „ 18 h. 20 h. „ 22 h.	from 0 h. to 2 h. 4 h. „ 10 h. 12 h. „ 18 h. 20 h. „ 22 h.

EXPERIMENTS IN WIRELESS TELEGRAPHY.

AUTHORITY FOR SENDING AND RECEIVING.

SUMMARY OF CONDITIONS OF ISSUE.

N.B.—Under the Wireless Telegraphy Act, 1904, the Postmaster-General's authority is necessary before any apparatus for wireless telegraphy is installed or worked.

(Note.—All sending stations must also be equipped for reception.)

1. Applicants must produce evidence of British nationality and two written references from persons of British birth and of standing, not related to them.

2. Installation must be approved by Postmaster-General.

3. Secrecy of correspondence must be observed.

4. Applicants must satisfy the Postmaster-General that they have in view some definite object of scientific value or general public utility. If scientific research is intended they should be certified as competent investigators by a Government Department or some recognised scientific body.

5. Each sending station must be under the charge of a person who has satisfied the Postmaster-General, by examination or otherwise, that he has attained:—

(a) A sufficient knowledge of the adjustment and operation of the apparatus which he wishes to work.

(b) A knowledge of the regulations of the International Convention in so far as they relate to the prevention of inter-

ference and impose certain duties on all wireless operators; (these are contained in Section V of the "Postmaster-General's Hand-book for Wireless Operators," which is sold by the Stationery Office).

- (c) An operating speed of at least 12 words (Morse) a minute, sending and receiving.

A fee of 5s. will be charged for the examination referred to above, when necessary.

A licensee not possessing the above qualifications may be allowed, exceptionally, to employ a qualified operator to work the sending apparatus.

6. It is proposed to charge small fees to cover clerical expenses and expenses of inspection, etc. For each station authorised to use power up to 10 watts the charges, which will cover the use of receiving as well as sending apparatus, will comprise an initial licensing fee of 10s., plus an annual fee of £1, payable in advance (*i.e.*, 30s. for the first year and £1 for each succeeding year). Higher fees will be charged for more powerful stations.

7. Transmission will be sanctioned only to specified and duly authorised stations, not exceeding five in number. The written consent of the owner of each station to receive signals from the applicant's transmitting station should be furnished.

8. AERIALS.

The maximum height and dimensions allowed are as follows:—

Extreme height of aerial above ground	100 feet.
Total length of wire, including leading-in wires	100 feet for single-wire aerial; 140 feet of wire where two or more wires are used (<i>e.g.</i> , total length of 70 feet of double wire).

9. PORTABLE STATIONS.

General conditions same as for fixed stations. Power of portable sending stations will usually be limited to 10 watts.

Use will ordinarily be authorised only within 10 miles of a fixed point.

EXPERIMENTS IN WIRELESS TELEGRAPHY.

N AUTHORITY FOR THE USE OF RECEIVING APPARATUS.

CONDITIONS OF ISSUE, ETC.

N.B.—Under the Wireless Telegraphy Act, 1904, the Postmaster-General's authority is necessary before any apparatus for wireless telegraphy is installed or worked.

Formal licences to conduct experiments in wireless telegraphy cannot at present be granted; but, pending the settlement of certain outstanding questions, the Postmaster-General is prepared to authorise the use of wireless apparatus for the reception of signals on the following conditions:—

1. The applicant shall produce evidence of his British nationality and two written references. (A certificate of birth should be furnished if possible; but this will not be insisted upon if the two referees testify of their own knowledge that the applicant is of British nationality. The references should be given by persons of standing, who are British subjects and not related to the applicant.)

2. There shall be no divulgence to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or any use whatever made of any message received by means of the apparatus;

3. The installation shall be subject to the approval of the Postmaster-General;

4. The aerial shall not exceed the under-mentioned maximum height and dimensions:—

Extreme height of aerial above ground	100 feet.
Total length of wire including leading-in wires	100 feet for single wire aerial; 140 feet of wire where two or more wires are used (<i>e.g.</i> , total length of 70 feet of double wire.)

5. Valves shall not be used without the special authority of the Postmaster-General.

6. The apparatus shall be open to inspection at all reasonable times by properly authorised officers of the Post Office.

7. A fee of 10s. shall be paid. (It is contemplated that an annual charge of 10s. shall be made in respect of each experimental receiving licence to cover the expenses of the issue of the licence and the inspection of the station.)

PROCEDURE TO BE FOLLOWED:

The applicant* should furnish (by letter addressed to the Secretary, G.P.O., E.C.1.):—

- (a) A formal acceptance of the foregoing conditions:—
- (b) Evidence and references as described in (1);
- (c) His full Christian names, age and particulars of his occupation;
- (d) A remittance of 10s.;
- (e) A description of the apparatus which it is proposed to instal, and, if authority is desired for the use of valves, a diagram of the circuits in which they would be used;
- (f) A sketch showing the form, height and dimensions of the proposed aerial (including leading-in wires);
- (g) The address at which the apparatus would be installed.

Any wireless apparatus belonging to the applicant which is in Post Office custody will be released as soon as authority is granted for the use of such apparatus. The production of a permit from the Post Office for the use of wireless receiving apparatus will be sufficient authority for the purchase by the person or firm to whom the permit has been granted of such apparatus as comes within the terms of the permit. The sales in these cases need not be reported to the Post Office by the vendors. If necessary, this form as well as the permit for the use of the apparatus, should be produced for the vendor's inspection.

N.B.—Authority to use wireless apparatus cannot be issued to a minor (*i.e.*, a person under 21 years of age). Application should accordingly be made on his behalf by his parent or guardian who should proceed as indicated above and should, in addition, state his (or her) relationship to the minor. In such cases the evidence and references specified in condition (1) should be furnished BOTH AS REGARDS THE MINOR AND HIS PARENT OR GUARDIAN. There would be no objection to a minor working the authorised apparatus as the agent of his parent or guardian.

○ EXTRACT FROM CONVENTION RELATING TO INTERNATIONAL AIR NAVIGATION (1919):—

ART. 14.—No wireless apparatus shall be carried without a special licence issued by the State whose nationality the aircraft possesses.

* See *Nota Bene* above as regards minors.

Such apparatus shall not be used except by members of the crew provided with a special licence for the purpose.

Every aircraft used in public transport and capable of carrying ten or more persons shall be equipped with sending and receiving wireless apparatus when the methods of employing such apparatus shall have been determined by the International Commission for Air Navigation.

This Commission may later extend the obligation of carrying wireless apparatus to all other classes of aircraft in the conditions and according to the methods which it may determine.

P

LICENCE TO ESTABLISH WIRELESS TELEGRAPH AIRCRAFT STATIONS.

To all to whom these presents shall concern.

I, the Right Honourable

His Majesty's Postmaster-General send greeting :

Whereas by reason of the provisions of the Telegraph Acts 1863 to 1916 and the Air Navigation Regulations 1919 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the United Kingdom or in any British aircraft except under and in accordance with a licence granted in that behalf by the Postmaster-General :

And whereas

(hereinafter called "the licensee") has applied to the Postmaster-General for the grant of a licence to establish instal and work apparatus for wireless telegraphy as defined in Section I (7) of the Wireless Telegraphy Act 1904 at the aircraft station or stations mentioned in the First Schedule hereto :

Now I the above-named

His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do hereby grant to the licensee during the term or period commencing on the day of the date hereof and terminating on the thirty-first day of December one thousand nine hundred and unless and until these presents and the licence or permission hereby given shall be determined as hereinafter provided licence and permission—

I. To establish instal and work for the purposes hereinafter mentioned at the aircraft station or stations specified in the First Schedule hereto apparatus for wireless telegraphy of the kind specified in the Schedules hereto (which apparatus is hereinafter referred to as "the licensed apparatus") ;

II. To send and receive messages by means of the licensed apparatus for the purposes and subject in all respects to the conditions and restrictions contained in the Second Schedule hereto.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions :—

1. In these presents (and in the Schedules hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say) :—

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "Naval signalling" means signalling by means by any system of wireless telegraphy between two or more ships or aircraft of His Majesty's Navy between ships or aircraft of His Majesty's Navy and Naval stations or between a ship or aircraft of His Majesty's Navy or a Naval station and any other wireless telegraph station.

The expression "Government aircraft signalling" means signalling by means of any system of wireless telegraphy between two or more Government aircraft between any Government aircraft and any wireless station or between any Government aerodrome and any other wireless station.

The expressions "the International Telegraph Convention" and the "International Telegraph Regulations" mean respectively the International Convention of St. Petersburg dated July 10th to 22nd 1875 and the Service Regulations made thereunder and include respectively any modifications of the Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention 1912" means the Convention signed at London on the 5th day of July 1912 and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The term "aircraft" includes all balloons, whether fixed or free, airships and flying machines.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. The licensed apparatus shall not be used by the licensee or by any other person either on behalf or by permission of the licensee for the despatch or receipt of messages except messages authorised by this licence.

3.—(1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling or Government aircraft signalling.

(2) Whenever the operators at any signal station of the licensees perceive through the medium of the instruments used by them that Naval signalling or Government aircraft signalling is proceeding they shall refrain from using the licensed apparatus until all indication that Naval signalling or Government aircraft signalling is proceeding shall have ceased.

(3) These provisions for the protection of Naval signalling or Government aircraft signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. For the purpose of this licence the licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

5. The licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 1916 by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business so far as the same are applicable to the licensee.

6. The licensee shall observe the provisions of the Radiotelegraph Convention 1912 so far as they are not inconsistent with the other provisions of this licence, the expressions "ship"

and "ship station" in the Convention being read as if "aircraft" and "aircraft station" respectively were substituted therefor.

7. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Postmaster-General from time to time for the purpose of preventing interference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

8. The licensee shall comply in all respects with all such directions and regulations as may from time to time be given or made by the Secretary of State for Air.

9. The licensed apparatus shall not without the consent of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedules hereto.

10. The licensee shall at all times indemnify the Postmaster-General against all actions claims and demands which may be brought or made by any Corporation Company or person in respect of any injury arising from any act licensed or permitted by these presents.

11. The licensee shall so far as possible receive from aircraft ships and light stations all requests for assistance and all signals of distress and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the licensee.

12.—(1) The licensed apparatus at each of the aircraft stations mentioned in the First Schedule hereto shall be worked only by operators holding Air Operators' certificates issued by the Postmaster-General and such operators shall only work the apparatus in accordance with the tenor of the certificate which they hold and subject in all respects to the conditions of this licence.

(2) Air Operators' Certificates will be of two classes a First Class Certificate authorising the holder to work wireless apparatus on aircraft for the sending or receiving of messages in general and a Second Class Certificate authorising the holder to work wireless apparatus on aircraft for the purpose of sending and receiving spoken messages only. Such certificates will be granted to approved natural-born British subjects of such technical proficiency and will be subject to such conditions as the Postmaster-General shall from time to time prescribe and they may be endorsed or withdrawn at the discretion of the Postmaster-General in accordance with the conditions to which the certificates respectively are subject.

13. The licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and not intended for receipt by means of the licensed apparatus. The licensee shall exhibit at each of the stations specified in the Schedule hereto a copy of Section II of the Post Office (Protection) Act 1884 and any contravention of that section by any person in the employment of the licensee shall be deemed to be a breach of the provisions of this licence.

14. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the aircraft stations hereby licensed for the purpose of inspecting and may inspect any apparatus fixed or being in such stations

respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the working and user of such apparatus and telegraphic instruments respectively.

15. The licensee shall carry on every aircraft on which an aircraft station is established under this licence a print or copy of the licence certified under the hand of an appropriate officer of the Postmaster-General to be a true copy and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the aircraft calls.

16. The licensee shall forthwith pay to the Postmaster-General for and in respect of the licence hereby granted a royalty of five shillings per annum in respect of each aircraft station at which the licensed apparatus is installed.

17. Except with the consent in writing of the Postmaster-General the licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

18.—(1) Inasmuch as an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus and if and whenever any such emergency shall arise it shall be lawful for any Naval Military Air or Police Officer or any other person authorised by the Secretary of State for Air to take possession of the licensed apparatus or any part thereof in the name and on behalf of His Majesty and to use the same for His Majesty's service and any such officer or person so authorised may enter upon any aircraft on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid and subject to such use may use the same or allow it to be used for such ordinary services as may in his discretion seem fit to him or may prohibit and take steps to prevent use of the same and issue directions which shall be obeyed by the licensee to prevent such use.

(2) Any such officer or person so authorised as aforesaid may instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct and such persons may enter upon any aircraft on which any apparatus is installed accordingly or the said officer or person so authorised as aforesaid may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer or person so authorised as aforesaid may prescribe and the licensee shall obey and conform to all such directions.

(3) The licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

19. The Postmaster-General may at any time in his absolute discretion give notice in writing to determine these presents and the licence or permission hereby granted at the end of

one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Postmaster-General under any condition or provision herein contained.

20. In case of any breach non-observance or non-performance by or on the part of the licensee of any of the provisions or conditions herein contained then and in any such case the Postmaster-General may by notice in writing under his seal revoke and determine these presents and the licences powers and authorities hereinbefore granted and each and every of them as to all or any of the aircraft stations hereby licensed and thereupon these presents and the said licences powers and authorities and each and every of them shall absolutely cease determine and become void as to all or any of the said aircraft stations (as the case may be) but without prejudice to any right of action or remedy which shall have accrued or shall thereafter accrue to the Postmaster-General under any condition or provision herein contained.

21. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend, maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion

think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

22. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any officer of the Post Office duly authorised by him and may be served by sending the same in a registered letter addressed to the licensee at the usual or last-known place of residence or business of the licensee and any notice to be given by the licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office London.

As witness my hand and seal this
day of one thousand nine
hundred and

FIRST SCHEDULE.

[illegible]

SECOND SCHEDULE.

PROVISIONS AS REGARDS QUALITIES OF APPARATUS AND CONDITIONS OF WORKING.

1. The licensed apparatus shall be in keeping with scientific and technical requirements as determined by the Postmaster-General from time to time and shall comprise apparatus for sending and receiving messages. The licensed apparatus at each aircraft station shall be properly adjusted in all respects before the aircraft commences its flight.

2. The sending apparatus used at each aircraft station shall be of such a character that the waves emitted are undamped; and the receiving apparatus at each aircraft station

shall be of such a character as to afford the greatest possible protection from disturbance during the reception of messages.

3. The siding apparatus installed at each aircraft station shall be so constructed as to be capable of using waves of 600 metres interrupted-continuous wave (hereinafter referred to as "the Aircraft Ship Wave") and 900 metres continuous wave (hereinafter referred to as "the Aircraft Normal Wave"); it may also be constructed so as to be capable of using the following waves, viz.—220, 300, 450 and 800 metres interrupted-continuous waves and 200 to 500 metres, 650 to 950 metres and 2,000 to 3,000 metres continuous waves : Provided always that, if the apparatus is so

constructed as to be capable of using waves of 2,000 to 3,000 metres. It must also be capable of using 2,400 metres continuous wave: Provided further that the wavelengths before referred to shall not be used without the written permission of the Postmaster-General.

The use of the Aircraft Ship Wave shall be confined to the system known as interrupted undamped wave or tonic train Interrupted Continuous Wave and the Aircraft Normal Wave shall be used only for continuous undamped waves or for the purpose of sending and receiving spoken messages.

4. The wavelengths referred to in this Schedule shall be measured by the standard of measurement for the time being in use by the Postmaster-General.

5. The sending apparatus installed at each aircraft station may be so constructed as to be capable of varying the wave emitted by an amount equal to but not exceeding 3,000 cycles per second above and below the frequency of the normal wave in use: Provided always that such variation from the normal wave shall be used only—

- (a) When first calling up;
- (b) When communication has not been established when first calling up; or
- (c) In case of distress.

6. The receiving apparatus installed at each aircraft station may be constructed so as to receive waves of any length, but it shall be constructed so as to be capable of receiving messages on the Aircraft Ship Wave and the Aircraft Normal Wave: Provided always that if the sending apparatus shall be capable of using the wavelengths mentioned in paragraph 3 of this Schedule the receiving apparatus shall be so constructed as to be capable of receiving messages on these wavelengths.

7. The input of power to the licensed apparatus measured at the terminals of the power generator or battery shall not exceed 100 watts: Provided that when vacuum valves having heated filaments constitute a part of either the sending or receiving apparatus or both the power employed for heating the said filaments shall be excluded in computing the maximum input.

8. The licensed apparatus shall not be used except during actual flight or in case of forced landing.

9. The licensed apparatus may be used for receiving messages on any subject, but shall be used only for sending messages on the following subjects:—

- (a) Distress signals;
- (b) Meteorological information;
- (c) Forced landings and landing instructions;
- (d) Positions;
- (e) Supply of fuel and spare parts;
- (f) Origin, destination, or course of flight.

10. Except with the written permission of the Postmaster-General, the Aircraft Normal Wave and no other wave shall be used for the sending and receipt of messages to and from—

- (a) Other aircraft stations;
- (b) Ground stations specified by the Secretary of State for Air.

11. Except with the written permission of the Postmaster-General, the Aircraft Ship Wave and no other wave shall be used for the sending and receipt—

- (a) Of messages to and from ships of His Majesty's fleet and merchant ships;
- (b) Of such messages as are rendered neces-

sary by reason of exceptional emergency and not coming within the scope of the above-mentioned provisions for the use of the Aircraft Normal Wave.

12. The procedure employed for the sending and receipt of messages to and from each aircraft station and other aircraft stations shall conform to instructions laid down by the Secretary of State for Air.

Signed sealed and delivered by
in the presence of

On behalf of the Postmaster-General

Q WIRELESS DIRECTION FINDING STATIONS.

USE BY THE MERCANTILE MARINER.

ADMIRALTY NOTICE TO MARINERS, No. 524 OF
25TH MARCH, 1920.

The following is promulgated for information—

The Admiralty have recently received evidence from various sources that the existence of Wireless Direction Finding Stations in the United Kingdom, France, Canada, the United States and Germany, and the regulations under which these stations are operated, are not as generally known throughout the Mercantile Marine as is desirable in view of the immense value of the system of wireless direction finding as an aid to navigation, especially in thick and foggy weather.

2. On the other hand, returns rendered by the stations in the United Kingdom show that where the system is known to masters it is beginning to be more extensively used, not only when atmospheric conditions render it impossible to obtain the ship's position by any other means, but as a check on positions obtained by the ordinary method of navigation.

3. Information on this subject was first published in Admiralty Notice to Mariners No. 1,019 of May 23rd, 1919. This Notice has since been revised, and the latest information on the subject is contained in Admiralty Notice to Mariners No. 363 of the year 1920 (reproduced in Board of Trade Notice to Mariners). This Notice should be studied by masters who desire to make use of this system: the procedure to be adopted, which varies to some extent for the different stations and as to the wavelength to be used, is set out therein in detail. It is equally necessary that W/T operators should study the procedure.

4. Briefly put, a ship requiring a bearing calls up the D.F. station or stations from which it is desired to receive a bearing, singly or together, according to the procedure laid down. The station or stations reply with the bearing (true) of the ship from that station.

5. The following stations are established in the United Kingdom: Peterhead, Berwick, Flamborough, Lizard, Amlwch, Rhyl, Carnore, Lame, Seaview (Malin Head).

6. These stations are operated by the Royal Navy, but are available for the use of the Mercantile Marine.

7. A charge of five shillings (5s.) will be made as from April 1st, 1920, for each bearing asked for and given. Thus, if bearings from two stations or two separate bearings from one station were asked for, the charge would be ten shillings (10s.).

8. Charges will be collected by the Accountant-General of the Navy from the Administration controlling and operating the ships concerned, in accordance with the present system of collecting charges for W/T commercial messages.

9. The accuracy with which bearings can be taken depends on certain conditions outlined in the Notice to Mariners referred to, but, although the bearings given by a station within the section over which it is designed to work can generally be considered accurate to within two degrees, it must be distinctly understood that the Admiralty provide this service on the express condition that they incur no liability for any consequences resulting directly or indirectly from any inaccuracy in the bearings given from any failure in the service, or from any other cause whatever.

(Notice No. 524 of 1920, dated March 25th.)

Authority.—The Lords Commissioners of the Admiralty. (H. 2049/20.)

R WIRELESS DIRECTION FINDING STATIONS.

ADMIRALTY NOTICE TO MARINERS, No. 838 OF 22ND MAY, 1920.

1. Wireless direction finding (D.F.) stations are stations set up ashore equipped with receiving apparatus which enables them to ascertain the direction from which wireless signals transmitted by another station emanate.

2. The accuracy with which bearings can be taken depends on the conditions outlined below; but, although in general the bearings taken by a station within the sector over which it is designed to work can generally be considered accurate to within two degrees, the administrations controlling these stations cannot accept any responsibility for the consequences of a bearing being inaccurate.

3. It is, however, pointed out that if at least three D.F. stations can be employed and if they are so situated as to give intersecting bearings, considerable reliance can be placed upon the result of 3 simultaneous bearings thus obtained, provided that the "triangle of error" (sometimes called the "cocked hat") formed by the intersection of the bearings is small.

4. In order to obtain the greatest possible degree of accuracy, it is important that the ship should not transmit with too much power. Signals should, however, be fairly strong and clear; great care must be taken to keep the note and strength steady, and to pay strict attention to spacing.

5. It must be borne in mind that it is impossible for the majority of existing D.F. stations to distinguish between a bearing and its reciprocal (*i.e.*, there is always a possible error of 180°), and that bearings are often unreliable at night and in very bad weather, also when the direction runs roughly parallel with the coast line.

6. The methods of asking for and giving bearings and the waves to be used will shortly be standardised by International agreement; and the particulars of the D.F. stations will eventually appear in the International List of Radiotelegraph Stations. Meanwhile, each country is publishing regulations governing the use of its own D.F. stations as set out below.

7. It should be noted that there are two principal systems of D.F. stations at present in use, *viz.* :—

(a) Where each D.F. station is fitted with transmitting and receiving gear and works independently of others.

(b) Where several D.F. stations (all of them usually near a harbour entrance or difficult passage) are linked together by special land telegraph lines, being thus controlled by one station which alone is fitted with transmitting apparatus. The controlling station in such cases is not necessarily a D.F. station but may be an ordinary coast station.

REGULATIONS FOR CANADIAN AND NEWFOUNDLAND D.F. STATIONS.

8. The following independent D.F. stations are established :—

Station.	Call Signal.	Range (miles).	Lat. N.	Long. W.
Chebucto Head	VAV	250	44 30 01	63 31 20
Canso ..	VAX	100	45 19 24	60 58 25
Cape Race	VAZ	250	46 39 10	53 05 05

9. These stations keep watch and take bearings on the 600-metre wave.*

10. A ship requiring a bearing should call the D.F. station required and transmit a government message requesting the bearing.

Example.—A ship, *s.s. Nonsuch*, call sign XYZ, calls up Chebucto Head in the ordinary way and, on receiving "K" (go on), makes the message as follows :—

"Call" S Radio Nonsuch 1, 5, 10 (day of month) 10.50 M (time)=Officer in Charge Chebucto Head=Request bearing=Master + XYZ.

11. The D.F. station will then acknowledge receipt of the message and, if not ready to take the bearing at once, will direct the ship to wait.

12. When ready to take the bearing, the D.F. station will make "K" (go on), whereupon the ship will make the figure "2" 30 times, commencing with the "Call" and ending with the "Cross" and her own call signal.

13. If the D.F. station is not satisfied with the bearing, it will make the "repeat" sign (?) and the ship will again make the figure "2" as above, but only 20 times.

14. In default of such request for a repetition, the D.F. station does not transmit until it is ready to give the bearing. To do so, the station calls the ship and sends (as a government message) the TRUE bearing of the ship from the station in degrees from 0° to 359°, the angles being measured from true north (0°) clockwise through true east (90°), true south (180°), and true west (270°).

REGULATIONS FOR D.F. STATIONS IN THE UNITED STATES.

15. The following U.S. Naval D.F. stations are now in operation for the purpose of furnishing bearings to vessels in the Western Atlantic. Stations marked * are in continuous operation in foggy weather only.

The stations given in the former Notice, which are not included in the following list, are to be expunged from the charts.

* After 1st August, 1920, the 800 metre wave will be used exclusively both for transmission and reception. See notice "L" under "Canada."

Station.	Call Signal.	Latitude. N.			Longitude. W.		
		°	'	"	°	'	"
Bar Harbour, Me.	NBD	44	18	36	68	11	27
Gloucester, Mass.	NAD	42	35	19	70	41	08
Deer Island, Mass.*	NAD	42	21	15	70	57	30
Surfside, Nantucket, Mass.	NBS	41	14	42	70	05	56
Montauk, Long Island, N.Y.	NAH	41	03	09	71	57	27
Fire Island, N.Y.	NAH	40	38	07	73	12	32
Sandy Hook, N.J.	NAH	40	28	12	74	01	06
Mantoloking, N.J.	NAH	40	01	30	74	03	10
Cape May, N.J.	NSD	38	56	41	74	53	10
Bethany Beach, Del.	NSD	38	32	45	75	03	21
Hog Island, Va.	NCZ	37	22	36	75	42	37
Cape Henry, Va.	NCZ	36	55	16	75	59	51
Cape Hatteras, N.C.	NDW	35	14	22	75	31	42
Cape Lookout, N.C.	NAN	34	36	13	76	32	15
North Island, N.C.	NZW	33	13	21	79	11	06
Morris Island, S.C.*	NAO	32	41	36	79	53	17

16. Where two or more of the foregoing D.F. stations have the same call signal it indicates that they are connected by telegraph to and under the control of a central control station the call signal being the call of the central control station. When a request for bearings is made the central control station invariably answers with a bearing from each of the D.F. stations under its control.

17. The following signals have been authorised and will be used until further notice:—

Signal. Meaning.

QTE? .. What is my true bearing?

QTE .. Your true bearing is — degrees from — D.F. station.

18. To obtain bearings, the D.F. station should be called on 800 metres in the usual manner, and the call followed by the signal "QTE?" meaning "What is my true bearing?" When told by the D.F. station to "K" (go ahead), the ship's operator should follow the procedure outlined below:—

(a) Transmit the ship's call signal for 30 seconds.

(b) Make dashes, each dash 5 seconds long, for one minute, with the ship's call signal after each dash.

(c) Terminate with the signal "K" (go ahead).

19. If satisfactory bearings are obtained, the operator at the D.F. station will call the vessel in the usual manner and reply "QTE" followed by the true bearing in degrees (0 to 359) spelled out in words, and the name of the D.F. station from which the bearing was obtained;

otherwise a repetition of the test will be requested.

20. The ship's operator should acknowledge receipt of the bearings by answering the D.F. station in the usual manner and repeat, in numerals, the bearings received. This procedure enables all stations concerned to check the bearings.

21. All United States Naval D.F. stations keep watch and transmit on 800 metres for merchant vessels, and this wavelength should be used for calling and answering and carrying on all communication with these stations.

22. In order that the operation of shore D.F. stations may be checked up, a brief report should be forwarded to the Director, Naval Communications, Navy Department, Washington, D.C., containing:—

(a) Name of ship.

(b) Name of D.F. station.

(c) Date and G.M.T. at which wireless bearing was given.

(d) Bearing given by D.F. station.

(e) Estimated position of ship at above time and date by methods other than wireless.

(f) The probable degree of accuracy of the estimated position.

(g) Weather conditions at above time.

(h) Remarks, if any.

(i) Signature of master or responsible navigating officer.

REGULATIONS FOR D.F. STATIONS IN THE UNITED KINGDOM.

23. The following D.F. stations are established:—

Station.	Call Signal.	Latitude. N.			Longitude. W.		
		°	'	"	°	'	"
Peterhead	BVL	57	33	30	1	49	05
Berwick	BVG	55	41	48	1	53	40
Flamborough	BVN	54	07	05	0	04	58
Amlwch*	BXV	53	24	28	4	18	20
Rhyl*	BZW	53	18	20	3	28	50
Lizard	BVY	49	59	07	5	12	18
Carnsore	BVZ	52	11	50	6	21	00
Larne	BXJ	54	51	15	5	48	15
Seaview†	BXK	55	22	00	7	19	25

* Rhyl is not fitted with transmitting apparatus and is controlled by Amlwch.

† Seaview is not fitted with transmitting apparatus and is controlled by Malin Head (GMH), which keeps watch on 600 metres.

24. All the above D.F. stations keep watch and take bearings on the 450 metres wave (*see note*). Except as shown in the notes they all work as independent stations and can transmit, as well as receive, on 450 metres.

Note.—Ships with Marconi apparatus can adjust their transmitting gear very nearly to this wave (using reduced power) by cutting out half the primary transmitting condenser and adjusting the A.T.I. till the earth lamp shows maximum current in the aerial. The primary slider should be "all in."

25. The actual procedure to be adopted by ships requiring bearings will depend upon what stations are concerned. It should be observed that if the stations to be called do not all keep watch on the same wave (*e.g.*, Malin Head and Larne), bearings should be asked for separately. If on the other hand the stations to be called all keep watch on the same wave (*e.g.*, Lizard and Carnsore), they should be called up together and the bearings taken in one operation. If, however, two or more stations are linked by special land lines (*e.g.*, Amlwch and Rhyl), only one of them should be called up. In such cases, however, the ship must specify in the preliminary signal the D.F. stations which are required to supply bearings.

26. The following abbreviations are to be used:—

Signal.	Meaning.
QTE? ..	"What is my true bearing from you (or from —)?"
QTE ..	"Your true bearing from me (or from —) was — degrees."

27. The ship calls the station or stations on the appropriate wave, making "QTE?" In conjunction, if necessary, with the call signals of the stations from which bearings are required and also (if the call is not made on 450 metres) by the figures "450," signifying that the ship will shift to 450 metres for the taking of the bearing. The ship then awaits instructions.

Example 1.

A ship whose call signal is XYZ requires bearings from Amlwch (BXV) and Rhyl (BZW). The ship, having first shifted to 450 metres, calls Amlwch thus:—

CT BXV BXV de XYZ QTE BXV BZW?
She then awaits instructions.

Example 2.

The ship requires a bearing from Seaview (BXX). The ship has to use 600 metres to call Malin Head (GMH).

She calls on 600 metres, thus:—

CT GMH GMH de XYZ QTE BXX? 450.
She then gets ready to shift to 450 metres and awaits instructions.

28. The station or stations called then make the necessary arrangements and, when ready, answer in alphabetical order of their call signals (if more than one was originally called) and make "K" (go on) preceded by "450" if 450 had been made in the original call.

Example 1.

Amlwch, in Example 1 above, warns Rhyl by land line and, when both are ready, makes on 450 metres:—

CT XYZ de BXV K.

Example 2.

Malin Head, in Example 2 above, warns Seaview by land line and then makes on 600 metres:—

CT XYZ de GMH 450 K.

Malin Head then shifts to 450 metres so as to be ready to give the result when received by wire from Seaview.

29. On receiving "K," the ship, having shifted transmitting wave to 450 metres (if not already done), then makes her own call signal for 45 seconds and awaits the result.

Example 1.

The ship, in Example 1 above, makes on 450 metres:—

CT BXV de XYZ XYZ XYZ, etc.
(for 45 seconds) XYZ.

Example 2.

The same as Example 1, reading GMH for BXV.

30. The station or stations then reply (in alphabetical order if more than one) either asking the ship to repeat (?) or giving the result. The result is given by the signal QTE followed as necessary by the call signal and by a group of three figures (000 to 359) indicating the true bearing from 0° to 359°, reckoned as in paragraph 14, of the ship from the station. Several bearings can be combined into one message, each bearing immediately following the call signal of the station which took it. The time of handing in is always expressed in Greenwich mean time for all messages giving bearings to merchant ships.

Example 1.

Rhyl, in Example 1 above, is not satisfied with the bearing and informs Amlwch. Amlwch makes on 450 metres:—

CT XYZ de BXV?

The ship at once complies by making on 450 metres:—

CT BXV de XYZ XYZ XYZ, etc.
(for 45 seconds) XYZ.

Rhyl is then satisfied that the bearing is 340° and informs Amlwch, while Amlwch finds that its own result is 37°. Amlwch therefore makes on 450 metres:—

CT XYZ XYZ de BXV 1 9.45 M (time)
=QTE BZW 340 BXV 037+BXV.

Example 2.

Seaview, in Example 2 above, gets a satisfactory bearing of 329° and informs Malin Head. The latter makes on 450 metres:—

CT XYZ XYZ de GMH 2 10.46 S (time)
=QTE BXX 329+GMH.

Example 3.

Had the ship merely asked Lizard (BVY) for a bearing, Lizard, finding it to be 246°, would make on 450 metres:—

CT XYZ XYZ de BVY 1 7.6 M (time)
=QTE 246+BVY.

31. The ship, on receiving the result, acknowledges receipt in the ordinary way, and makes the "end of work" sign. This sign is then repeated by the station or stations concerned. It is important that the "end of work" sign should not be omitted, since it not only indicates that the operation is finished, but it also shows that all concerned are about to resume watch on their normal wave.

REGULATIONS FOR FRENCH D.F. STATIONS.

32. The following D.F. stations are established :—

Station.	Call Signal.	Latitude. N.			Longitude. E.		
		°	'	"	°	'	"
Le Havre	FFU	49	31	30	0	07	00 E.
Berni-res	UHN	49	20	00	0	25	00 W.
Cherbourg	FFC	49	36	32	1	36	00 W.
Tréguier	FOC	48	50	08	3	13	56 W.
Ouessant—Pen ar Roch *	PHY	48	26	27	5	05	33 W.
Brest—Guilpavas ..	PHA	48	27	00	4	26	30 W.
Brest—Capucins † ..	HUD	48	19	12	4	34	48 W.
Pointe du Raz	EPU	48	02	22	4	43	52 W.
Lorient	FFL	47	44	05	3	20	45 W.
Chémoulin §	FUH	47	14	06	2	17	54 W.
Rochefort—Soubise ..	HOB	45	56	00	1	00	00 W.
Barre de l'Adour	FLO	43	31	40	1	31	20 W.
Casablanca—Chetaba ‡ ..	FCH	33	35	21	7	34	10 W.

* Ouessant—Pen ar Roch answers FFF.

† Brest—Capucins answers FFK.

‡ Casablanca—Chetaba answers CNP.

§ Chémoulin closed pending transfer to Ville-ès-Martin; near St. Nazaire, of which further notice will be given.

33. The regulations for French D.F. stations are similar to those for the United Kingdom.

REGULATIONS FOR ITALIAN D.F. STATIONS.

34. The following D.F. station is established :—

Station.	Call Signal.	Latitude. N.			Longitude. E.		
		°	'	"	°	'	"
Murano	IRM	45	27	40	12	21	22

Note.—The above station cannot answer the calls from ships, but is in direct communication by telegraph with the W.T. station Carbonera (ICZ).

35. Vessels wishing to obtain bearings from Murano D.F. station must call up Carbonera station, and the latter, having obtained the required information from Murano, will duly transmit it to them. The bearings are True, and are given in degrees from 0° to 359°.

36. The procedure is as follows :—

A ship whose call signal is ABC wishes a bearing.

On a wave of 600 metres she will signal :—

 \overline{CT} ICZ ICZ de ABC QTE ?

Carbonera will answer :—

 \overline{CT} ABC de ICZ \overline{AS}

Carbonera then wires Murano; when ready, Carbonera replies :—

 \overline{CT} ABC de ICZ K 6.

ABC, after 30 seconds, signals :—

 \overline{CT} ICZ de ABC ABC ABC etc., for 45 seconds.

37. If dissatisfied with the bearing, Murano through Carbonera will ask the ship to repeat.

Carbonera signals :—

 \overline{CT} ABC de ICZ \overline{UD} .

ABC repeats the signal as given above.

38. When satisfied with the bearing, which is assumed to be 170°, at 9.45, Murano will transmit it by telegraph to Carbonera, whence it is passed to the ship as follows :—

 \overline{CT} ABC de ICZ de IRM 9.45 M \overline{BT} QTE 170 \overline{AR} ICZ.

ABC acknowledges receipt :—

 \overline{CT} ICZ de ABC R \overline{SK} .

REGULATIONS FOR GERMAN D.F. STATIONS.

39. The following D.F. stations on the German North Sea Coast are established. The stations belong to the State Marine but are also available for public use :—

Station.	Call Signal.	Latitude. N.	Longitude. E.
Wilhelmshaven *	KAN	53 31 00	8 09 30
List	VBD	55 00 12	8 23 12
Nordholz	MNF	53 47 06	8 38 30
Borkum	FNR	53 34 55	6 40 54

* Control station.

40. (a) A ship (call sign ABC) requiring a bearing from each of the three stations, the following procedure is to be employed :—

CT KAN KAN KAN DE ABC AR
 CT ABC ABC ABC DE KAN AR K
 CT KAN DE ABC BT QTE AR
 CT ABC DE KAN VE AS
 CT FNR FNR FNR MNF MNF MNF
 VBD VBD VBD DE KAN BT PEILUNG
 (Bearing)
 600 m—WELLE ABC
 (metre wave)
 CT ABC DE KAN BT BITTE VV GEBEN AR
 (Please send V's)
 CT KAN DE ABC BT V's ABC AR
 CT FNR MNF VBD DE KAN AR K
 CT KAN DE FNR BT PEILUNG ABC . . . GRAD
 (Bearing) (Degrees)
 FNR 1018 AR
 Similarly MNF and VBD pass their bearings to KAN
 CT FNR MNF VBD DE KAN VE
 CT ABC DE KAN BT PEILUNG 1018 ? AR K
 (Have you received Bearing)
 CT KAN DE ABC VE VE AR SK
 CT ABC DE KAN VE SK
 CT FNR MNF VBD DE KAN SK

(b) A ship (call sign ABC) requiring her position to be obtained by means of bearings from the three stations, the following procedure is to be employed :—

With the exception that QTF is substituted for QTE the procedure is as in (a) above until the three stations have passed the bearings to KAN.

KAN then makes to ABC :—

CT ABC DE KAN BT IHR STANDORT NACH
 (your position by means of
 FUNK PEILUNG UM 1018 IST—GRAD
 bearings at is degrees
 —MIN—SEK NORD-BREITE
 minutes seconds north
 —GRAD—MIN—SEK OST-LÄNGE
 degrees minutes seconds east)
 AR K

The procedure is then as in the last 3 lines of (a) above.

41. Note.—Mid-European time is used, the hours and minutes being expressed in four figures from 0000 to 2359.

Note.—This Notice is a revision of former Notice No. 363 of 1920.

(Notice No. 838 of 1920, dated May 22nd.)

ADMIRALTY NOTICE TO MARINERS.

No. 952 OF JUNE 15TH, 1920.

FIXING POSITION BY WIRELESS DIRECTIONAL BEARINGS.

I.—GENERAL.

S Fixing position by directional wireless is very similar to fixing by cross bearings from visible objects, the principal difference being that, when using a chart on Mercator's Projection allowance has to be

made for the curvature of the earth, the wireless stations being generally at very much greater distances than the objects used in an ordinary cross bearing fix.

Although fixing position by wireless directional bearings is dependent for its accuracy upon the degree of precision with which it is at present possible to determine the direction of wireless waves, subsequent confirmation of the course and distance made good, by the receipt of additional bearings, would afford confidence

to those responsible in the vessel as the land is approached under weather conditions that preclude the employment of other methods.

At the present time, from shore stations with practised operators and instruments in good adjustment, the maximum error in direction should not exceed 2° for day working, but it is to be noted that errors at night may be larger, although sufficient data on this point is not at present available.

II.—TRACK OF WIRELESS WAVE.

The track of a wireless wave being a great circle is represented on a chart on Mercator's Projection by a flat curve, concave towards the equator; this flat curve is most curved when it runs in an east and west direction and flattens out as the bearing changes towards north and south. When exactly north and south it is quite flat and is then a straight line, the meridian. The true bearing of a ship from a wireless telegraphy station, or *vice versa*, is the angle contained by the great circle passing through either position and its respective meridian.

III.—CONVERGENCY.

Meridians on the earth's surface not being parallel but converging at the poles, it follows that a great circle will intersect meridians as it crosses them at a varying angle unless the great circle itself passes through the poles (*i.e.*, is a meridian). The difference in the angle formed by the intersection of a great circle with two meridians (*i.e.*, convergency) depends on the angle the great circle makes with the meridian, the middle latitude between the meridians and the difference of longitude between the meridians.

This difference is known as the convergency and can be approximately calculated from the formula:—

Convergency in mins. = diff. long. in minutes $\times \sin$ mid. lat.

Convergency may be readily found from the Convergency Scale attached to this Notice, or it may be found by traverse table entering the D. long. as distance and mid. lat. as course; the resulting departure being the convergency in minutes.

IV.—TRUE AND MERCATORIAL BEARINGS.

Meridians on a Mercator's chart being represented by parallel lines, it follows that the true bearing of the ship from the station, or *vice versa*, cannot be represented by a straight line joining the two positions, the straight line joining them being the mean mercatorial bearing

which differs from the true bearing by $+\frac{1}{2}$ the convergency. As it is this mean mercatorial bearing which we require, all that is necessary when the true bearing is obtained from a W/T station is to add to or subtract from it $\frac{1}{2}$ the convergency and lay off this bearing from the station.

Note.—Charts on the Gnomonic Projection which facilitate the plotting of true bearings are now in course of preparation.

V.—SIGN OF THE $\frac{1}{2}$ CONVERGENCY.

Provided the bearings are always measured in degrees north 0° to 360° (clockwise) the sign of this $\frac{1}{2}$ convergency can be simply determined as follows:—

N. lat. - $\frac{1}{2}$ convergency is + to the bearing by the W/T station when ship is E. of station.

N. lat. - $\frac{1}{2}$ convergency is - to the bearing given by the W/T station when ship is W. of station.

S. lat. - The opposite.

When the W/T station and the ship are on opposite sides of the equator, the factor \sin mid. lat. is necessarily very small and the convergency is then negligible. All great circles in the neighbourhood of the equator appear on the chart as straight lines and the convergency correction as described above is immaterial and unnecessary.

VI.—EXAMPLE.

A ship is by D.R. in lat. $48^\circ 45' N.$, long. $25^\circ 30' W.$, and obtains wireless bearings from Sea View $244\frac{1}{2}^\circ$ and from Ushant $277\frac{1}{2}^\circ$. What is her position?

Sea View - Lat. $55^\circ 22' N.$ Long. $7^\circ 19\frac{1}{2}' W.$
D. R. - " $48^\circ 45' N.$ " $25^\circ 30' W.$

Mid Lat. - $52^\circ 03' N.$ Diff. long. $1090.5'$
Convergency = $1090.5 \times \sin 52^\circ = 859'$ or $\frac{1}{2}$ convergency = $7^\circ 09'$.

The true bearing signalled by Sea View was $244\frac{1}{2}^\circ$, as ship is west of the station (North lat. see paragraph V.), the $\frac{1}{2}$ convergency will be "minus" to the true bearing signalled.

Therefore the mercatorial bearing will be $237\frac{1}{2}^\circ$ nearly.

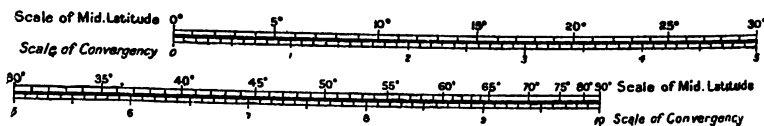
Similarly with Ushant.

Lat. D. R. - $48^\circ 45' N.$ Long. $25^\circ 30' W.$
" Ushant - $48^\circ 26\frac{1}{2}' N.$ " $5^\circ 05\frac{1}{2}' W.$

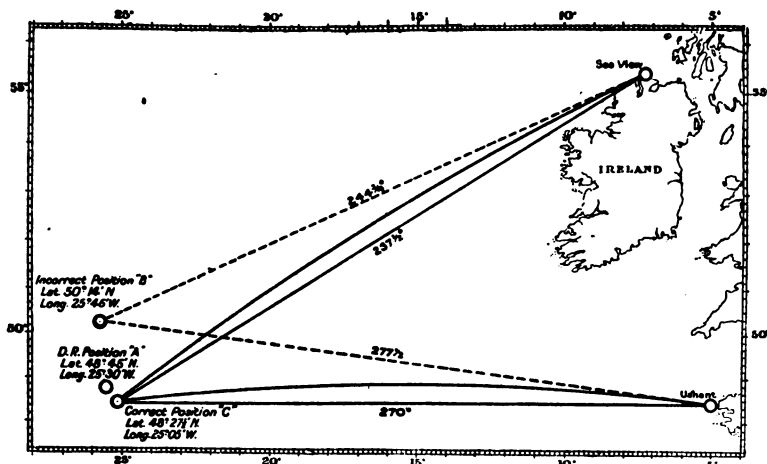
Mid lat. - $48^\circ 36' N.$ Diff. long. $1224.5' W.$
Convergency $1224.5 \times \sin 48^\circ 36' = 919'$ or $\frac{1}{2}$ convergency = $7^\circ 40'$.

The true bearing signalled by Ushant was $277\frac{1}{2}^\circ$, as ship is west of the station (North lat. see paragraph V.), the half convergency will be

Scales for obtaining the Convergency for 10' Diff. Longitude in different Latitudes



Example:— Mid Lat. $50^\circ 30'$, diff. long. 282; To find the Convergency.
Under $50^\circ 30'$ on Mid. Lat. scale read 7.7 on scale of Convergency
which multiplied by 28.2 gives 217' the Convergency



"minus" to the true bearing signalled. Therefore the mercatorial bearing will be 270° nearly.

¶ Laying off $237\frac{1}{2}^\circ$ and 270° on the chart from Sea View and Ushant respectively the intersection will be in :

Lat. $48^\circ 27\frac{1}{4}'$ N., long. $25^\circ 05'$ W., which is the ship's position.

¶ Note.—In plotting the positions the largest scale chart available that embraces the area should be used. A station pointer will be found convenient for laying off the bearings where the distances are great.

The accompanying chartlet drawn on the Mercator's Projection shows the above positions and the error involved by laying off the true bearings as signalled from Sea View W/T station and Ushant W/T station.

The curved lines are the great circles passing through Sea View and ship's position and Ushant and ship's position.

The pecked lines are the true bearings laid off as signalled, their intersection (B) being in lat. $50^\circ 14'$ N., long. $25^\circ 46'$ W., or approximately $110'$ from the correct position.

The straight lines are the mean mercatorial bearings laid off from Sea View and Ushant and their intersection (C) gives the ship's position very nearly, i.e., lat. $48^\circ 27\frac{1}{4}'$ N., long. $25^\circ 05'$ W.

Position A is the ship's D.R. position, lat. $48^\circ 45'$ N., long. $25^\circ 30'$ W., which was used for calculating the $\frac{1}{2}$ convergence.

Note.—As the true position of the ship should have been used to obtain the $\frac{1}{2}$ convergence, the quantity found is not correct, but it could be recalculated using lat. and long. (C) and a more correct value found. This, however, is only necessary if the error in the ship's assumed position is very great.

VII.—ACCURACY OF THIS METHOD OF PLOTTING.

Although this method is not rigidly accurate, it can be used for all practical purposes up to

1,000 miles range, and a very close approximation found to the lines of positions upon which the ship is at the moment the stations receive her signals.

VIII.—USE OF W/T BEARINGS WITH OBSERVATIONS OF HEAVENLY BODIES.

It follows that W/T bearings may be used in conjunction with position lines obtained from observations of heavenly bodies, the position lines from the latter being laid off as straight lines (although in this case also they are not strictly so), due consideration being given to the possible error of the W/T bearings. Moreover, W/T bearings can be made use of at short distances as "position lines" in a similar manner to the so-called "Sumner-line" when approaching port, making the land, avoiding dangers, etc.

IX.—CONVERSE METHOD.

When ships are fitted with apparatus by which they record the wireless bearings of shore stations whose positions are known, the same procedure for laying off bearings from the shore stations can be adopted, but it is to be remembered that in applying the $\frac{1}{2}$ convergence to these bearings it must be applied in the converse way, in both hemispheres, to that laid down in paragraph V.

(Notice No. 952 of 1920.)

AIR MINISTRY NOTICE TO AIRMEN, No. 103, DATED SEPTEMBER 30TH, 1920. ROYAL NAVY WIRELESS DIRECTION FINDING STATIONS.

It is hereby notified :—

The Aircraft may use the Wireless Direction Finding Stations operated by the Royal Navy, under the conditions laid down for the use of these stations by the Mercantile Marine, in Admiralty "Notice to Mariners," No. 524, of March 25th, 1920.

The following stations are established in the United Kingdom:—

Station.	Wave-length.	Call Sign.	Latitude N.	Longitude W.
Amlwch (a)	450 metres	BXV	53 24	4 18
Berwick		BVG	55 42	1 54
Carnsore		BVZ	52 12	6 21
Flamborough		BVN	54 07	0 05
Larne		BXJ	54 51	5 48
Lizard		BVY	49 59	5 12
Peterhead		BVL	57 34	1 49
Rhyl (a)	600 metres	BZW	53 18	3 29
Seaview (b) (Malin Head)		BXX	55 22	7 19

Note.—(a) Rhyl is not fitted with transmitting apparatus, and is controlled by Amlwch.

(b) Seaview has no transmitting apparatus, and is controlled by Malin Head (GMH), which keeps watch on 600 metres.

2. The actual procedure to be adopted by aircraft requiring bearings will depend upon what stations are concerned. It should be observed that if the stations to be called do not all keep watch on the same wave (e.g., Lizard and Carnsore), they should be called up together, and the bearings taken in one operation. If, however, two or more stations are linked by special land lines (e.g., Amlwch and Rhyl) only one of them should be called up. In such cases, however, the aircraft must specify in the preliminary signal the D.F. stations which are required to supply bearings.

3. The following abbreviations are to be used:—

Signal.	Meaning.
QTE? ..	"What is my true bearing from you (or from —)?"
QTE ..	"Your true bearing from me (or from —) was — degree."

4. The aircraft calls the station or stations, on the appropriate wave, making "QTE?" in conjunction, if necessary, with the call signals of the stations from which bearings are required; and also (if the call is NOT made on 450 metres) by the figures "450," signifying that the aircraft will shift to 450 metres for the taking of the bearing. The aircraft then awaits instructions.

Example 1.

An aircraft whose call signal is XYZ requires bearings from Amlwch (BXV) and Rhyl (BZW). The aircraft, having first shifted to 450 metres, calls Amlwch thus:—

CT BXV BXV de XYZ QTE BXV BZW?
The aircraft then awaits instructions.

Example 2.

The aircraft requires a bearing from Seaview (BXX). The aircraft has to use 600 metres to call Malin Head (GMH).

The aircraft calls on 600 metres, thus:—

CT GMH GMH de XYZ QTE BXX? 450

The aircraft then gets ready to shift to 450 metres and awaits instructions.

5. The station or stations called then make the necessary arrangements, and, when ready, answer in alphabetical order of their call signals (if more than one was originally called), and make "K" (go on) preceded by "450" if 450 had been made in the original call.

Example 1.

Amlwch, in Example 1 above, warns Rhyl

by land line, and, when both are ready, makes on 450 metres:—

CT XYZ de BXV K.

Example 2.

Malin Head, in Example 2 above, warns Seaview by land line and then makes on 600 metres:—

CT XYZ de GMH 450 K.

Malin Head then shifts to 450 metres, so as to be ready to give the result when received by wire from Seaview.

6. On receiving "K," the aircraft, having shifted transmitting wave to 450 metres (if not already done), then makes her own call signal for 45 seconds, and awaits the result.

Example 1.

The aircraft, in Example 1, para. 4, makes on 450 metres:—

CT BXV de XYZ XYZ CYZ, etc. (for 45 seconds) XYZ.

Example 2.

The same as Example 1, reading GMH for BXV.

7. The station or stations then reply (in alphabetical order if more than one) either asking the aircraft to repeat (?) or giving the result. The result is given by the signal QTE, followed, as necessary, by the call signal and by a group of three figures (000 to 359) indicating the true bearing from 0° to 359° of the aircraft from the station. Several bearings can be combined into one message, each bearing immediately following the call signal of the station which took it. The time of handing in is always expressed in Greenwich mean time for all messages giving bearings to aircraft.

Example 1.

Rhyl, in Example 1 above, is not satisfied with the bearing and informs Amlwch. Amlwch makes on 450 metres:—

CT XYZ de BXV?

The aircraft at once complies by making on 450 metres:—

CT XYZ de XYZ XYZ XYZ, etc. (for 45 seconds) XYZ.

Rhyl is then satisfied that the bearing is 340° and informs Amlwch, while Amlwch finds that its own result is 37°. Amlwch therefore makes on 450 metres:—

CT XYZ XYZ de BXV 1 9.45.M (time)
= QTE BZW 340 BXV 037+BXV.

Example 2.

Seaview, in Example 2 above, gets a satis-

factory bearing of 329° and informs Malin Head. The latter makes on 450 metres :—

CT XYZ XYZ de GMH 2 ro.46 S (time)
=QTW BXX 329+GMH.

Example 3.

Had the aircraft merely asked Lizard (BVV) for a bearing, Lizard, finding it to be 246° would make on 450 metres :—

CT XYZ XYZ de BVV 1 7.6 M (time)
=QTE 246+BVV.

8. The aircraft, on receiving the result, acknowledges receipt in the ordinary way and makes the "end of work" sign. This sign

is then repeated by the stations concerned. It is important that the "end of work" sign should not be omitted, since it not only indicates that the operation is finished, but it also shows that all concerned are about to resume watch on their normal wave.

9. Further information on this subject is contained in Admiralty "Notices to Mariners," Nos. 363 of February 25th, 1920; 524 of March 25th, 1920, and 838 of May 22nd, 1920, which should be consulted.

By Command of the Air Council,
W. F. NICHOLSON.

*Air Ministry, London, W.C. 2.
September 30th, 1920.*

UNITED STATES OF AMERICA

THE declaration of independence of the States of the American Union was adopted by Congress, July 4th, 1776. The Constitution of September 17th, 1787, lays down the basis of government under which (modified by amendments in 1787, 1791, 1798, 1804, 1865, 1868, 1870 and 1913) this great and powerful Republic is now governed.

The Union comprises 48 STATES, each of which is provided with a Legislature of two Houses, a Governor at the head of the Executive and a judicial system. The district of Columbia (D.C.) is the seat of the Federal Government, and was provided by the State of Maryland for this purpose in 1791. It is co-extensive with the City of Washington, and embraces an area of 60 miles. The TERRITORIES of Alaska and Hawaii are governed by local Legislatures, whose Acts may be modified or annulled by Congress. The grand total of the superficies governed under the U.S.A. Constitution amounts to 3,574,658 square miles.

N.B.—There are, moreover, DEPENDENCIES administered by the U.S.A. Government. Their rule is undertaken by a Governor and staff appointed by the President. Porto Rico and the Philippines belong to this division, although provided with Representative Government. Guam, in the Marianne Archipelago (Pacific Ocean), and the Samoan Islands are pure Dependencies administered by the U.S. Navy Department. Wireless in all these instances is controlled by the Navy Department in war time, but in peace time the radio stations of Porto Rico, Hawaii and Alaska are under the jurisdiction of the Department of Commerce, and all commercial transmitting radio stations operated in these dependencies must be licensed by this Department, and the operators of such stations must also be licensed.

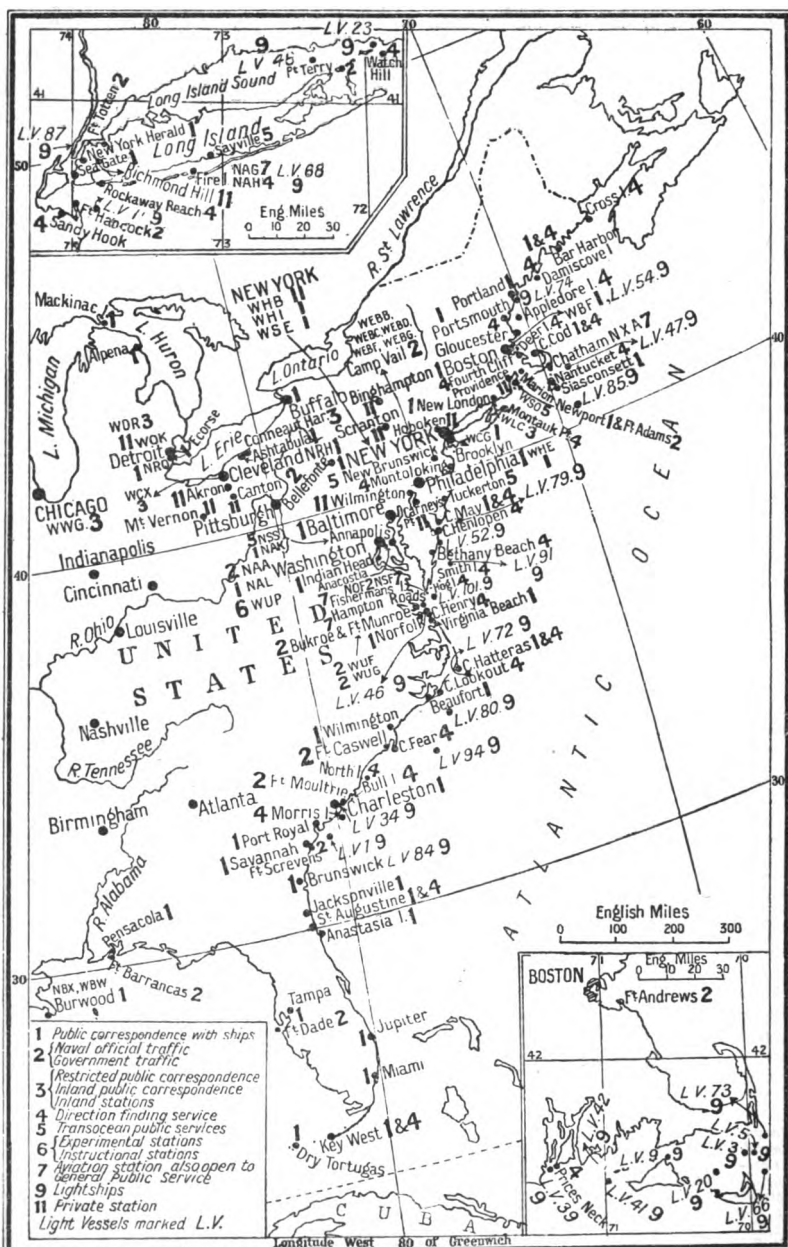
The "CANAL ZONE" on the Isthmus of Panama ranks as a Dependency, but it has been judged best to print the wireless particulars relating thereto separately under the heading "Panama—Canal Zone."

CONTROL.

The Congress of the United States has delegated to the Department of Commerce the duty of the enforcement of the Wireless Communication Laws and the International Radio-telegraph Convention, and the work is handled through the Bureau of Navigation, Washington.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Officials.	Title.	Address.
<i>Navy—</i> Rear-Admiral W. H. G. Bullard, U.S.N.	Director of Naval Communications ..	Washington
<i>Army—</i> Maj.-Gen. Sir G. O. Squier, K.C.M.G ..	Chief Signal Officer	Washington
<i>Commerce—</i> Mr. Joshua W. Alexander	Secretary of Commerce	Washington
Mr. E. F. Sweet	Assistant Secretary of Commerce	Washington
Mr. E. T. Chamberlain	Commissioner of Navigation	Washington
Mr. A. J. Tyrer	Deputy Commissioner of Navigation	Washington
Mr. W. D. Terrell	Chief Radio Inspector	Washington



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There are, in addition, seventeen inspectors and assistant inspectors, stationed at various districts established by the Bureau of Navigation.

ORGANISATION.

In September and October, 1899, Senatore (then Mr.) Marconi installed a radio station for the purpose of reporting the International yacht races between the yachts *Shamrock* and *Columbia*. The *New York Herald* of October 1st, 1899, tells how wireless was used for sending bulletins from the steamships *Ponce* and *Grande Duchesse*, which followed the contending yachts.

According to the most reliable information obtainable, the first regularly operated radio stations in the United States were at Siasconset (Nantucket), Mass., and on Nantucket Shoals Lightship No. 66, work on which was started early in the summer of 1901. These stations were not experimental, or demonstrational, or temporary stations, but were erected for the particular purpose of providing for the regular daily transmission of ship news, and for regular communication and exchange of messages with vessels equipped with similar apparatus. They were owned and operated by the *New York Herald*, and were equipped with Marconi apparatus purchased from, and installed by, the English Marconi Company.

The *New York Herald* of August 17th, 1901, contained an account of how the first radiotelegraphic station at Siasconset got into communication by wireless with the Nantucket Shoals Lightship. The latter, on August 16th, received from the s.s. *Lucania*, of the Cunard Line, at a distance of 72 miles, the first connected wireless message ever radiated to the United States from an approaching vessel. That message ran, "All well on board."

In 1899 (the same year as that of the first wirelessly reported yacht races) the matter of establishing radio services in the TERRITORY of HAWAII was receiving official attention. It was not until March 1st, 1901, however, that radio stations on the island were opened for business, the apparatus being supplied with power by Marconi induction coils. On October 15th, 1908, a 10-kw. station was erected at Kahuku Point, in Oahu (Hawaii) and at that time this was probably the most powerful station on the Pacific. Uninterrupted night communication was established with the wireless station on Telegraph Hill, San Francisco, California, a distance of 2,100 miles. This constituted the first direct radio communication between Hawaii and the U.S.A. On April 1st, 1915, a wireless service was established between the station at Wahiawa, Oahu (Hawaii), and the United States Naval Station at Tuluila, Samoa (2,400 miles distant). A composite system of equipment was used, with a transformer input of 6-kw., and a reliable nightly service has been maintained ever since.

In the TERRITORY of ALASKA radio communication takes the place of wired telegraph and telephone services. The large fish-canning companies rely almost exclusively upon their radio installations for communication between their canning plants, and for the maintenance of touch with their vessels engaged in this industry. Static interference (or atmospherics) is practically unknown there.

The number of wireless stations (excluding amateur installations) licensed in the United States at June 30th, 1920, totalled 5,972.

At June 30th, 1920, the *Government* shore wireless stations numbered 135, of which eighty-eight are in continental United States, twenty in Alaska, nineteen in the Philippines, three in the Canal Zone, two in Hawaii, and one each in Puerto Rico, Guam and Samoa. The *Government* ship stations total 470.

In practically every city of any size in the United States there are one or more radio clubs, composed of men interested in radiotelegraphy from a scientific standpoint, practical radio men, and amateur radio experimenters.* The most important of these clubs is the Institute of Radio Engineers

* For a list of the principal Clubs and Societies see Amateur section of this volume.

(particulars regarding which may be obtained from the Year-Book published in New York by the Institute).

ADMINISTRATION.

In 1910 an effort to regulate radio communication in the United States was made, when a Bill was prepared and passed by the Senate. It was not reached on the House of Representatives calendar, and therefore did not become effective.

The first Act requiring radioapparatus on certain passenger-carrying vessels was approved June 24th, 1910. Under this Act the Secretary of Commerce and Labour organised on July 1st, 1911, the radio service, composed of three inspectors, with headquarters at New York, N.Y., Baltimore, Md., and San Francisco, Cal.

The second Act, approved July 23rd, 1912, amended the above Act and is printed below.

The Act to regulate radio communication was approved August 13th, 1912. Under this Act transmitting stations and radio operators are licensed by the Secretary of Commerce. Transmitting stations are inspected to ascertain whether they comply with the requirements of the law. Radio operators are examined in order to determine their qualifications.

In addition to the above-mentioned Acts, the Department also enforces the London International Radiotelegraphic Convention rules of 1912, to which the United States is a party.

On March 4th, 1913, the Act abolishing the Department of Commerce and Labour and creating the Department of Commerce and the Department of Labour became effective. The enforcement of the radio laws was placed under the jurisdiction of the Secretary of Commerce.

The items published in the following pages are :—

A—Act of July 23rd, 1912.

B—Act of August 13th, 1912.

C—Regulations, 1912.

D—Regulations governing Ship and Land Radio Stations (as amended April 15th and May 1st, 1920).

E—Regulations governing Radio Operators.

F—General Information.

G—Certificate of Radio Inspection.

H—Master's Certificate of Radio Apparatus.

I—Radio Declaration, Form 753a.

J—Master's Certificate, Clearance Form 753b.

K—Licence for General Public Service Coast Radio Station.

L—Licence for Ship Radio Station.

M—Licence for Land Radio Station.

N—Licence for Amateur Radio Station.

O—Licence to Radio Operator, Commercial Extra First Grade.

P—Licence to Radio Operator, Commercial Grade.

Q—Licence to Radio Operator, Amateur First Grade.

R—Licence to Radio Operator, Amateur Second Grade.

S—Notice to Berne Bureau.

T—Act concerning International Communication.

U—United States Radio Compass Stations.

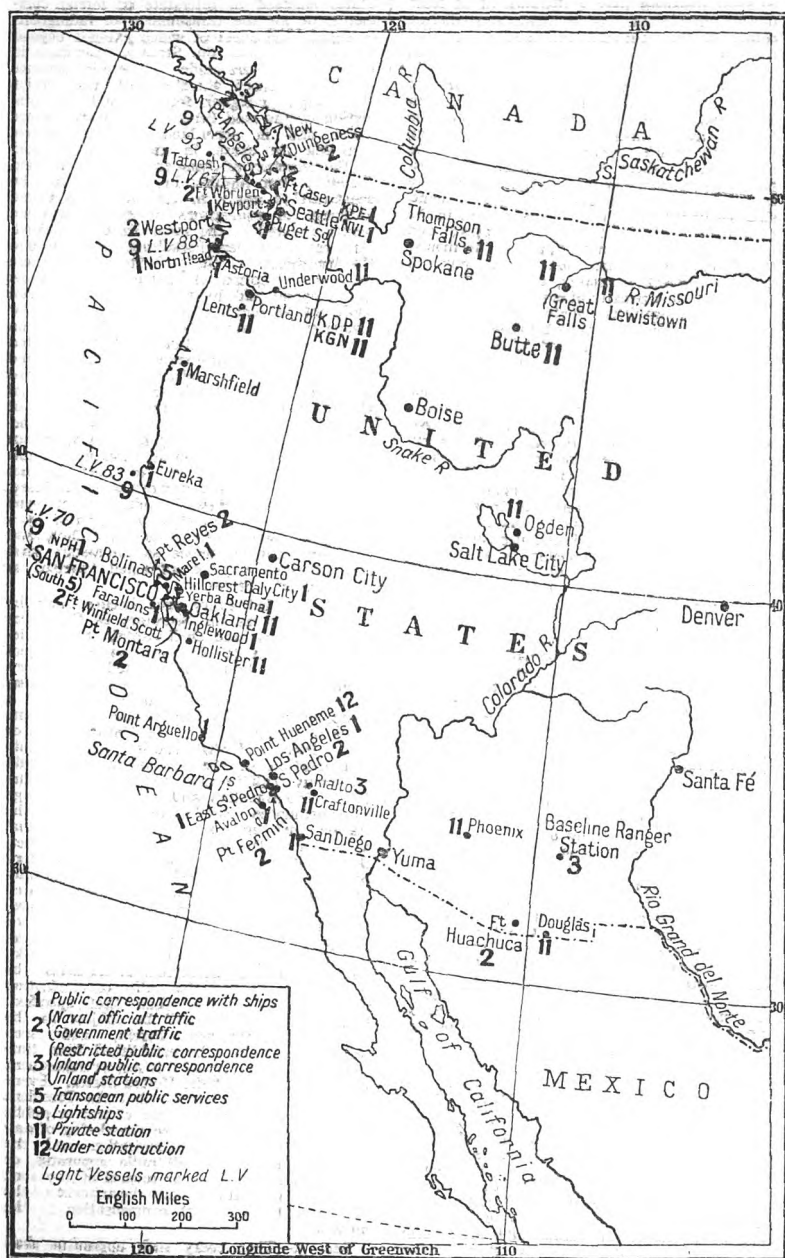
V—Public Resolution No. 48, dated June 5th, 1920.

A An Act approved July 23rd, 1912, amending section 1 of an Act entitled "An Act to require apparatus and operators for radio communication on certain ocean steamers," approved June 24th, 1910.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

"SEC. 1. That from and after October first, nineteen hundred and twelve, it shall be unlawful for any steamer of the United States or of any foreign country navigating the ocean

or the Great Lakes and licensed to carry, or carrying, fifty or more persons, including passengers or crew or both, to leave or attempt to leave any port of the United States unless such steamer shall be equipped with an efficient apparatus for radio communication, in good working order, capable of transmitting and receiving messages over a distance of at least one hundred miles, day or night. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable the sending set for at least four hours,



to send messages over a distance of at least one hundred miles, day or night, and efficient communication between the operator in the radio room and the bridge shall be maintained at all times.

"The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.

"That the provisions of this section shall not apply to steamers plying between ports, or places, less than two hundred miles apart."

SEC. 2. That this Act, so far as it relates to the Great Lakes, shall take effect on and after April first, nineteen hundred and thirteen, and so far as it relates to ocean cargo steamers shall take effect on and after July first, nineteen hundred and thirteen: *Provided*, That on cargo steamers, in lieu of the second operator provided for in this Act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The remaining sections of the Act of June 24th, 1910, which are unchanged, read as follows:—

SEC. 2. That for the purpose of this Act apparatus for radio communication shall not be deemed to be efficient unless the company installing it shall contract in writing to exchange, and shall, in fact, exchange, as far as may be physically practicable, to be determined by the master of the vessel, messages with shore or ship stations using other systems of radio communication.

SEC. 3. That the master or other person being in charge of any such vessel which leaves or attempts to leave any port of the United States in violation of any of the provisions of this Act shall, upon conviction, be fined in a sum not more than five thousand dollars, and any such fine shall be a lien upon such vessel, and such vessel may be labelled therefor in any district court of the United States within the jurisdiction of which such vessel shall arrive or depart, and the leaving or attempting to leave each and every port of the United States shall constitute a separate offence.

SEC. 4. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this Act by collectors of customs and other officers of the Government.

B AN ACT TO REGULATE RADIO COMMUNICATION.

APPROVED AUGUST 13TH, 1912.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United

States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a licence, revocable for cause, in that behalf granted by the Secretary of Commerce upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided*, That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a licence shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanour, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

SEC. 2.—That every such licence shall be in such form as the Secretary of Commerce shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the licence is granted; that every such licence shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wavelength or the wavelengths authorised for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorise the use of any apparatus for radio communication in any other station than that specified. Every such licence shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such licence shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorise the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

SEC. 3.—That every such apparatus shall at all times while in use and operation as afore-

said be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said licence for a period to be fixed by the Secretary of Commerce not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months, or both, in the discretion of the court for each and every such offence: *Provided*, That in case of emergency the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of June 24th, 1910.

Sec. 4.—That for the purpose of preventing or minimising interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce may grant special temporary licences to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wavelengths, at such hours, and under such conditions as will ensure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

Normal Wavelength.

C 1. Every station shall be required to designate a certain definite wavelength as the normal sending and receiving wavelength of the station. This wavelength shall not exceed 600 metres or it shall exceed 1,600 metres. Every coastal station open to general public service shall at all times be ready to receive messages of such wavelengths as are required by the Berlin Convention. Every ship station, except as hereinafter provided, and every coast station open to general public service, shall be prepared to use two sending wavelengths, one of 300 metres and one of 600 metres, as required by the International Convention in

force: *Provided*, That the Secretary of Commerce may, in his discretion, change the limit of wavelength reservation made by regulations first and second to accord with any international agreement to which the United States is a party.

Other Wavelengths.

2. In addition to the normal sending wavelength all stations, except as provided herein after in these regulations, may use other sending wavelengths: *Provided*, That they do not exceed 600 metres or that they do exceed 1,600 metres: *Provided further*, That the character of the waves emitted conforms to the requirements of regulations 3 and 4 following.

Use of a "Pure Wave."

3. At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wavelengths, more or less sharply defined, as indicated by a sensitive wavemeter, the energy in no one of the lesser waves shall exceed 10 per cent. of that in the greatest.

Use of a "Sharp Wave."

4. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

Use of "Standard Distress Wave."

5. Every station on shipboard shall be prepared to send distress calls on the normal wavelength designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wavelength.

Signal of Distress.

6. The distress call used shall be the international signal of distress • • • — — — • • •

Use of "Broad Interfering Wave" for Distress Signals.

7. When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

Distance Requirement for Distress Signals.

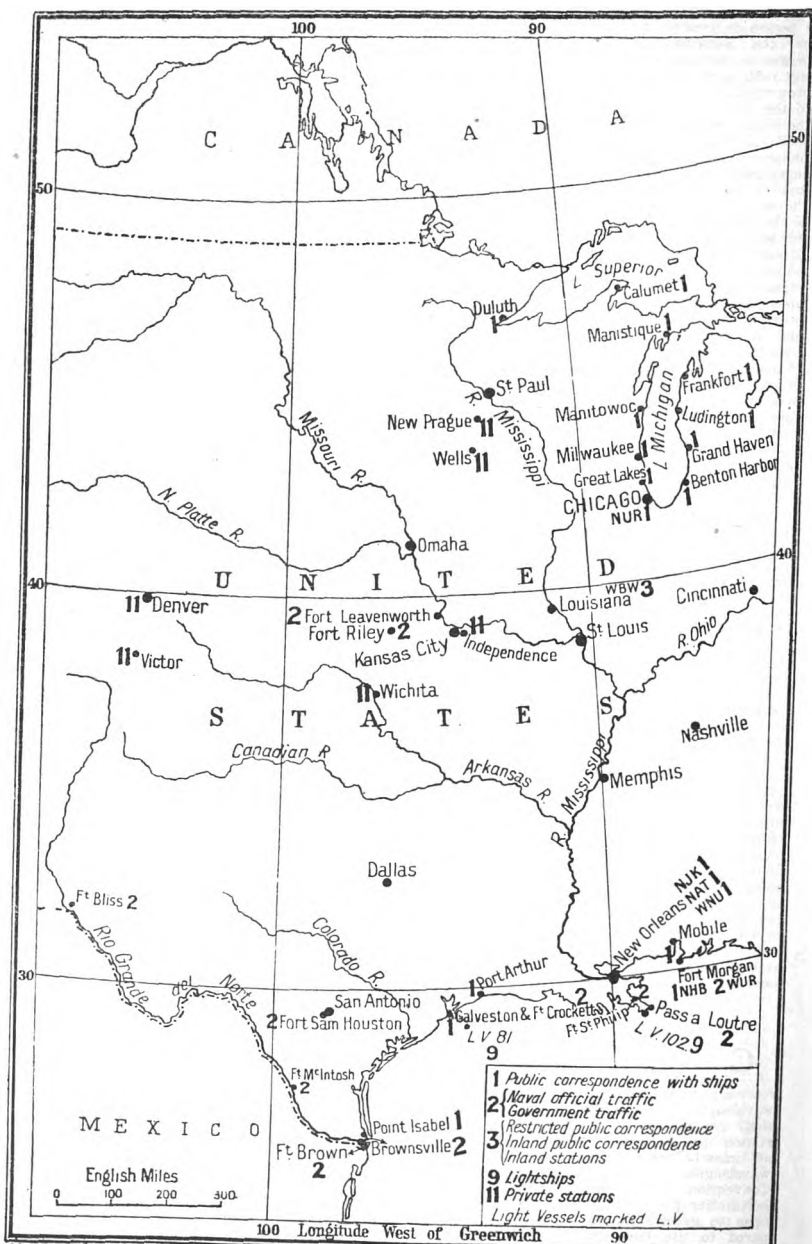
8. Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations 5 and 6 with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

"Right of Way" for Distress Signals.

9. All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

Reduced Power for Ships near a Government Station.

10. No station on shipboard when within fifteen nautical miles of a naval or military station shall use a transformer input exceeding 1 kw., nor, when within five nautical miles of such a station, a transformer input exceeding $\frac{1}{2}$ kw., except for sending signals of distress, or signals or radiograms relating thereto.

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Intercommunication.

11. Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen-in at intervals of not less than fifteen minutes, and for a period not less than two minutes, with the receiver tuned to receive messages of 300 metre wavelengths.

Division of Time.

12. At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations cannot be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wavelengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

Government Stations to Observe Division of Time.

13. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

Use of Unnecessary Power.

14. In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

General Restrictions on Private Stations:

15. No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wavelength exceeding 200 metres or a transformer input exceeding 1 kw., except by special authority of the Secretary of Commerce contained in the licence of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of one hundred dollars or twenty-five dollars, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

Special Restrictions in the Vicinities of Government Stations.

16. No station of the character mentioned in regulation 15 situated within five nautical miles of a naval or military station shall use a transmitting wavelength exceeding 200 metres or a transformer input exceeding $\frac{1}{2}$ kw.

Ship Stations to Communicate with Nearest Shore Stations.

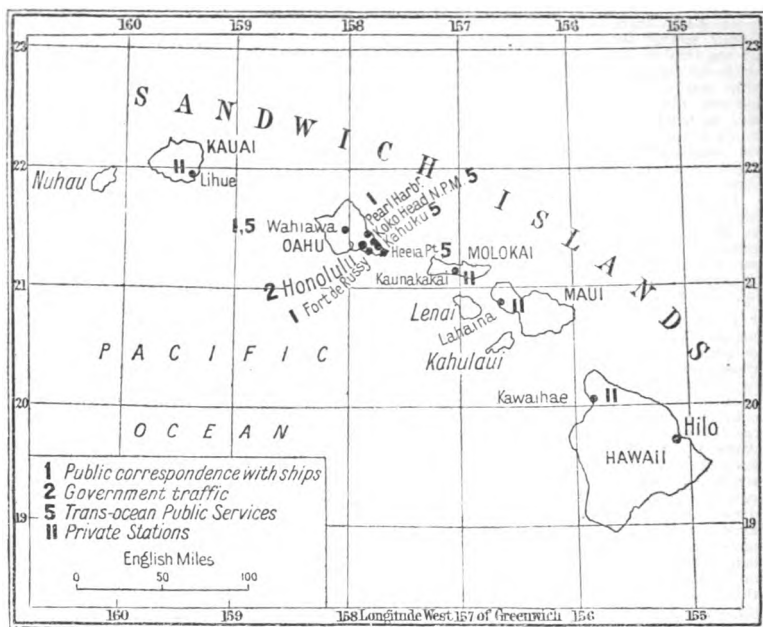
17. In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this cannot be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

Limitations for Future Installations in Vicinities of Government Stations.

18. No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations, to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin Convention of 1906, and future International Conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin Convention of 1906 and future International Conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within 100 nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of governmental business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered into the Treasury as miscellaneous receipts.

Secrecy of Messages.

19. No person or persons engaged in or having knowledge of the operation of any station or stations, shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed or their authorised agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof,



be punished by a fine of not more than two hundred and fifty dollars or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

Penalties.

For violation of any of these regulations, subject to which a licence under sections 1 and 2 of this Act may be issued, the owner of the apparatus shall be liable to a penalty of one hundred dollars, which may be reduced or remitted by the Secretary of Commerce and for repeated violations of any of such regulations the licence may be revoked.

For violation of any of these regulations, except as provided in regulation 19, subject to which a licence under section 3 of this Act may be issued, the operator shall be subject to a penalty of twenty-five dollars, which may be reduced or remitted by the Secretary of Commerce, and for repeated violations of any such regulations, the licence shall be suspended or revoked.

Sec. 5.—That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

Sec. 6.—That the expression "radio-communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid

of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

Sec. 7.—That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the court for each and every such offence, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offence.

Sec. 8.—That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections 4 and 7 of this Act, and so much of section 5 as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

Sec. 9.—That the trial of any offence under this Act shall be in the district in which it is committed, or if the offence is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in

the district where the offender may be found or into which he shall be first brought.

Sec. 10.—That this Act shall not apply to the Philippine Islands.

Sec. 11.—That this Act shall take effect and be in force on and after four months from its passage.

D REGULATIONS GOVERNING SHIP AND LAND RADIO STATIONS.

SHIP STATIONS.

1. On vessels coming under the Ship Acts, an emergency power supply, independent of the vessel's main electric power plant, must be provided which will enable radio messages to be sent for at least four hours over a distance of at least 100 miles day or night. The emergency power supply and equipment should be located and installed in such manner as to afford maximum protection against accident.

2. The radio transmitting apparatus operated from the emergency power supply, should be capable of functioning within two minutes after unexpected notice to the operator.

3. The complete equipment must be maintained in an efficient condition at sea.

4. The complete emergency equipment should be tested before each sailing and daily at sea by the operator or an inspector and a note of its performance entered in the radio log.

5. Radio inspectors or other duly authorised officers of the Government will occasionally call for test messages to be sent by means of the emergency apparatus, while the vessel is at sea.

6. An "induction coil" connected to "plain aerial" is not recommended as emergency apparatus on account of the high voltages produced which frequently damage the antenna insulation and on account of "vibrator troubles."

7. A motor generator or rotary converter operated by storage battery is probably the most satisfactory means available at present of energising the transmitting apparatus.

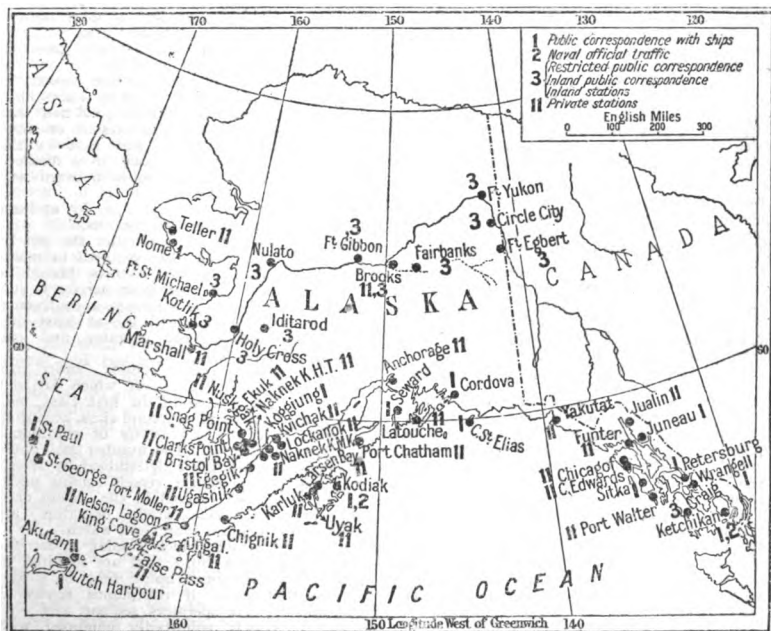
8. Any auxiliary engine for wireless purposes must operate on a fuel which will fulfil the requirements of Rule XI, section 5, of the General Rules and Regulations of the Steamboat Inspection Service, reading as follows:—

None of the inflammable articles specified in section 4472, Revised Statutes, or oil that will not stand a fire test of 300° F. shall be used as stores on any pleasure steamer or steamer carrying passengers except that vessels not carrying passengers for hire may transport gasoline or any of the products of petroleum for use as a source of motive power for motor boats or launches of such vessels (Sec. 4472, R.S.)

9. Every ship station shall carry a reasonable number of spares of such parts of both the main and emergency radiotelegraph equipments as are subject to undue wear, deterioration, or liability to accident.

10. One extra pair of head telephones, extra cords, and extra detectors must always be kept on hand.

11. A storage battery voltmeter, hydrometer, a supply of electrolyte, and distilled water should be part of the regular equipment, but are not prescribed in terms by statute. The absence of these and similar inexpensive



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emergency articles will be brought to the attention of the master and of the company installing the apparatus by the radio inspector, in writing, and if after a reasonable interval they have not been supplied, the inspector will communicate the fact to the Commissioner of Navigation.

12. The vessel's electric power for the operation of the main equipment shall, at all times while the steamer is under way, be available for the radio operator's use. On steamers where the dynamo is not run continuously there should be an efficient means of communication between the radio room and the dynamo room, in order that the radio operator may signal for power, as the law provides that he may not leave his post of duty.

13. Efficient communication between the radio room and the bridge must be maintained. A speaking tube or telephone will comply with this requirement. A bell and messenger service will not be acceptable unless there are special conditions justifying this equipment. The speaking tube or telephone must terminate in the radio room and on the bridge, or in the chart room if readily accessible from the bridge. If the radio room is adjacent to or accessible from the bridge so that orders may be transferred direct, no means of communication will be required. Any arrangement calling for the services of a third person to transmit the messages will not be satisfactory. The radio inspectors will notify the ship authorities whether the means of communication provided is satisfactory at the time of inspection.

14. On vessels of the United States it is the statutory duty of the master to see that one operator is on duty at all times. The radio service of the ship is under the supreme authority of the master.

15. Masters should require operators on duty to communicate with the officer on the bridge every half-hour.

16. Operators must make entries on the radio log every fifteen minutes, as evidence that a continuous watch is being maintained. The entries must, if possible, consist of the call letters of other stations communicating and a few words of the intercepted messages.

17. When vessels are in port the key to the radio room must at all times be on board in charge of the proper officer and the radio equipment shall be in such condition as to facilitate Government inspection.

CLASSIFICATION OF SHIP STATIONS AND GRADES OF OPERATORS REQUIRED.

18. First Class: Vessels having a continuous service. There shall be placed in the first-class vessels which are intended to carry twenty-five or more passengers:

(1) If they have an average speed in service of fifteen knots or more.

(2) If they have average speed in service of more than thirteen knots, but only subject to the two-fold condition that they have on board 200 persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than 500 sea miles between any two consecutive ports.

19. Second Class: Vessels having a continuous watch but a service of limited duration. Other vessels placed in the second-class must, during navigation, maintain a continuous watch for at least seven hours a day, and a watch of ten minutes at the beginning of every other hour.

20. Third Class: Vessels which have no fixed periods of service. All vessels which

are placed neither in the first nor in the second-class shall be placed in the third-class.

21. *Service* may be defined as preparedness to transmit and receive radio messages or signals at the rate of at least twenty words per minute.

22. *Watch* may be defined as preparedness to receive distress signals and call letters slowly. A "watcher" or cargo-grade operator will summon a first or second-class operator if necessary.

23. All American vessels required by the Act of July 23rd, 1912, to be equipped with radio apparatus, and operators must at all hours maintain a continuous watch; that is to say, an operator or *watcher* must be "listening-in" continuously. This requirement is outside of and above the requirement based on the classification under which the ship's station is licensed.

24. Vessels voluntarily equipped are not required to maintain this continuous watch. Vessels voluntarily equipped are, however, subject to the following requirements as to watch according to the class assigned to them in their station licences.

25. If a licence of the second class be issued to a voluntarily equipped vessel, the station must maintain a continuous watch for at least seven hours a day and a watch of ten minutes at the beginning of every hour.

26. The grade of operators required on vessels of each class are prescribed in the London Convention Service Regulations, Article X. A continuous watch may be maintained by one commercial second-grade operator and one cargo-grade operator on cargo steamers.

27. Passenger vessels coming under the Act of July 23rd, 1912, which carry or are licensed to carry twenty-five or more passengers, must be placed in the first class:

(a) If they have an average speed in service of fifteen knots or more.

(b) If they have an average speed in service of more than thirteen knots, but only subject to the twofold condition that they have on board 200 persons or more (passengers and crew), and that in the course of their voyage they go a distance of more than 500 sea miles between any two consecutive ports.

The service shall be carried on by at least two commercial first-grade operators.

28. Cargo vessels coming under the Act of July 23rd, 1912, which are required to maintain a continuous watch, must be placed in the second class if continuous service is not maintained. On cargo steamers a continuous watch may be maintained by at least one commercial second-grade operator and one cargo-grade operator.

29. Passenger vessels coming under the act of July 23rd, 1912, but which are not required to be entered in the first class, may be entered in the first or second class, according to whether continuous service or continuous watch is maintained. The number and grade of operators required is determined by service or watch. On passenger vessels coming under the Ship Act but entered in the second class at least two second-grade operators are required to maintain continuous watch.

30. Cargo vessels which coming under the Act of July 23rd, 1912, and are required to maintain a continuous watch, may be placed in the first class, if continuous service is maintained. (For operators, see par. 28.)

31. All vessels voluntarily equipped with radio apparatus and which have no specified

hours of service or watch must be placed in the third class.

32. Any vessel voluntarily equipped may be placed in the first class if continuous service is maintained, or in the second class if a continuous watch, or a watch of limited duration, such as specified above for vessels of the second class is maintained.

33. In all ship stations transmissions shall be made only by operators holding commercial first or second grade licences or higher.

34. Commercial service shall be maintained by not lower than commercial first-grade operators.

35. Vessels which are voluntarily equipped with radio apparatus for their own convenience and for the correspondence of officers and crew must employ at least one commercial second-grade operator or higher.

36. Radio telephone apparatus on vessels not coming under the Act of July 23rd, 1912, must be operated by a person holding a cargo-grade licence or higher.

37. The owners of ship stations desiring to change the classification of a ship must apply for a new licence.

LAND-STATIONS.

38. Coast stations are stations which transmit messages to vessels at sea or on the Great Lakes, or whose operations can interfere with the exchange of messages between ship and ship or ship and coast. The principal purpose of the regulation of radio communication, international and national, is to secure the greatest efficiency of maritime communication through this agency, especially as a means of promoting safety to life.

39. Inland stations are stations which cannot transmit messages to vessels at sea or on the Great Lakes and whose operations cannot affect the transmission of messages between ship and ship or ship and coast. This may be due to their geographical location or to their range, dependent on power and aerial, or conditions. In some instances actual inspection may be necessary to determine whether a station should be licensed as a coast station or an inland station. An operator or owner in doubt as to the classification of his station should communicate the facts to the radio inspector of his district when applying for a licence.

40. Stations are bound to give absolute priority to calls of distress from ships, to similarly answer such calls, and to take such action with regards thereto as may be required.

41. The working of stations shall be organised as far as possible in such manner as not to disturb the service of other stations.

42. All coast stations (par. 38), excepting general and restricted amateur stations, are required to be able to transmit on the wavelengths of 300 and 600 metres for the purpose of transmitting or relaying distress messages or signals and messages relating thereto, if necessary.

43. Coast stations primary intended for long waves and long-distance transmission may install an auxiliary antenna and auxiliary transmitter to comply with the short wavelength requirements.

44. The international standard wavelength is 600 metres, and the operators of all coast stations are required, during the hours the station is in operation, to "listen-in" at intervals of not less than fifteen minutes and for a period of not less than two minutes, with the receiving apparatus tuned to receive

this wavelength, for the purpose of determining if any distress signals or messages are being sent and to determine if the transmitting operations of the "listening stations" are causing interference with other radio communication.

45. General public service may be defined as "paid business," conducted on commercial wavelengths between ship and shore or ship and ship.

46. Limited public service may be defined as "paid business" between certain designated land stations, ships or lines of ships, and must be conducted on some authorised wavelength other than 300 or 600 metres.

47. All special service must be conducted on some authorised wavelength other than 300 or 600 metres, not interfering with general public service.

48. Limited commercial, special amateur, and all stations which have no authorised rates, shall not transmit or accept public correspondence from other stations, except in case of emergency.

49. If a general public-service coast station also maintains a limited commercial service with other stations on land or with vessels at sea, the limited commercial service must be conducted on some authorised wavelength other than 300 or 600 metres, but this service can be authorised on a general public-service coast station licence without stating the specific hours, it being understood that the limited commercial service is conducted only when no general public service business is on file.

50. If a general public-service coast station also maintains a public service between fixed points on land, the service between the land stations must be conducted on some authorised wavelength other than 300 or 600 metres, and a separate form, No. 761, should be submitted covering "Limited public service," giving the exact hours of such service.

CLASSIFICATION OF LAND STATIONS AND GRADES OF OPERATORS REQUIRED.

51. Both coast stations (the word "coast stations," "shore stations," and "coastal stations" are used interchangeably) and inland stations are divided for the purposes of the administration of the Act into the following classes:

- (1) Public-service stations—
 - (a) General.
 - (b) Limited.
- (2) Limited commercial stations.
- (3) Experiment stations for the development of radio communication.
- (4) Technical and training school station.
- (5) Special amateur stations.
- (6) General amateur stations.
- (7) Restricted amateur stations.

52. CLASS I.—(a) *Public-Service stations, general*, are those open to general business between coast and ships and include those operated by common carriers under the Act of February 4th, 1887, to regulate commerce, amended June 18th, 1910. They are required to maintain a constant service when open. Every coastal station open to public service shall at all times be ready to receive messages of such wavelengths as are required by the International Convention in force. (Sec. 4, Regulation 1, Act of August 13th, 1912.) The station rates are authorised in the licence and published in the Official Berne List. Whenever such stations do not insure a constant

service, transmitting and receiving day and night without interruption, the Secretary of the Navy is directed to open naval radio stations within 100 miles thereof to public business. (Sec. 4, Regulation 18, Act of August 13th, 1912.) The Secretary of War is authorised by the Act of May 26th, 1900 (31 Stat., 206), to open Alaskan military stations to public service.

53. General public service shall be conducted only by operators holding commercial first-grade licences or higher.

54. CLASS 1.—(b) *Public-service stations, limited*, are reserved for a limited public service, determined by the object of the correspondence or other circumstances independent of the system employed. Stations of this class transmit and receive public messages to and from certain stations only, which are designated in the licence. The rates are authorised in the licences, and if not published in the official list they may be obtained from the licensee.

55. The service of limited public service coast stations shall be carried on by commercial first-grade operators or higher.

56. The service of limited public service inland stations shall be carried on by commercial second-grade operators or higher.

57. CLASS 2.—*Limited commercial stations* are not open to public service and are licensed for a specific commercial service or services defined in the licence. Stations of this class must not transmit to or accept public messages from other stations. No rates are authorised.

58. If a coast station, the operators shall hold a commercial second-grade licence or higher. (Par. 57.)

59. CLASS 3.—*Experiment stations*.—The Secretary of Commerce is authorised by section 4 of the Act to grant special temporary licences "to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wavelengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations." Applicants for such licences should state any technical result they have already produced, their technical attainments, etc. The fact that an applicant desires to experiment with his equipment does not justify or require a licence of this class. Most experiments can be made within the limitations of general and restricted amateur station licences or by use of an artificial antenna to prevent radiation.

60. Experiment stations may be operated by a person holding an experiment and instruction grade licence or higher.

61. CLASS 4.—*Technical and training-school stations* will be licensed, according to the degree of technical training attained and imparted and to local conditions.

62. The grade of operators required will be specified when the licence is issued.

63. CLASS 5.—*Special amateur stations* may be licensed by the Secretary of Commerce to use a longer wavelength and a higher power on special application. Applications for this class from amateurs with less than two years' experience in actual radio communication will not be approved. The application must state the experience and purpose of the

applicant, the local conditions of radio communication, especially of maritime radio communication in the vicinity of the station, and a special licence will be granted only if some substantial benefit to the art or to commerce apart from individual amusement seems probable. (Sec. 4, Regulation 15, Act of August 13th, 1912.)

64. Special amateur coast stations must be operated by a person holding a commercial second-grade licence or higher. Inland stations may be operated by persons holding amateur second-grade licences or higher.

65. CLASS 6.—*General amateur stations* are restricted to a transmitting wavelength not exceeding 200 metres and a transformer input not exceeding 1 kw. (Sec. 4, Regulation 15, Act of August 13th, 1912.)

66. CLASS 7.—*Restricted amateur stations*, within five nautical miles of a naval or military station, are restricted to a wavelength not exceeding 200 metres and to a transformer input not exceeding $\frac{1}{2}$ kw. (Sec. 4, Regulation 16, Act of August 13th, 1912.)

67. Amateur first or second grade operators or higher are required for general and restricted amateur stations.

68. The licence does not specify the number of operators required, but provides that the station shall at all times while in operation be under the care of an operator licensed for that purpose. The grade and number of operators as required by law is determined by the service of the station.

69. *Special stations for exceptional distances* are land stations designed to carry on trans-oceanic radio communication as between the United States and European countries, or between the Pacific coast and Hawaii, or from the United States over similar long distances at sea to another land station, or (inland) to carry on radio communication overland over exceptional distances. These stations will all come under one of the classifications named above and the licence will indicate the stations for which communication is authorised and indicate the range.

REGULATIONS COMMON TO LAND AND SHIP STATIONS.

70. Any change in the characteristics of the radio apparatus or service of the station must be authorised by the Secretary of Commerce.

71. Every land and ship station open to general public service shall have, as a part of the station equipment, a copy of the Official Berne List of Radiotelegraph Stations and supplements thereto, as issued to comply with section 2 of the Act of July 24th, 1910. Information concerning the use of this list and method of procuring it is given on page 72, paragraph 196.

72. The service regulations of the London Convention, Article VII, paragraphs 1 and 2b, require a reduction of power or range under certain conditions. A proper resistance, impedance coil, or reactance regulator in the primary circuit is recommended. In certain cases the reduction of voltage or decreasing of coupling may be approved upon recommendations of radio inspectors.

73. Persons or corporations holding licences for radio stations, either land or ship, if practicable, must submit the licence to the radio inspector for the district, whenever the station or vessel goes out of commission for a period exceeding three months. The Commissioner of Navigation should be notified promptly of any

intention to suspend or discontinue the service of any commercial station.

74. If there is no intention to resume the same service or if the station or vessel will enter a different service from that indicated by the licence, the radio inspector will submit the licence to the Bureau, together with a statement of the facts. Otherwise the radio inspector may retain the licence in his files for safe keeping until the date of its expiration, when it will be forwarded to the Bureau for cancellation.

75. When the station goes into commission the owner may apply to the radio inspector for the return of the licence. The radio inspector will satisfy himself that the station corresponds to the schedule of the station as shown in the licence, and if so, the licence will be returned.

76. Stations desiring to conduct tests should communicate with the radio inspector by letter or telephone, stating the probable length of time that will be required. Stations conducting such tests or temporary experiments should "listen-in," to determine that no interference is being caused, and during the tests should "listen-in" frequently for the interference signal, "QRM." Stations conducting tests should transmit their official call signal frequently. Attention is invited to the Act of August 13th, 1912, section 5:

That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully, or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon a conviction thereof the owner or operator, or both, shall be punishable by a fine not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

77. The Department holds that interference caused by tests of the character described above (par. 76) is "wilful" when no "listening-in" precautions are taken and the call signal of the station sending is not repeated at intervals.

APPLICATIONS FOR SHIP AND LAND STATION LICENCES, RENEWALS, AND DUPLICATES.

78. The Act does not apply either afloat or ashore to—

(a) Apparatus for radio communication which merely receives radiograms and is not equipped for sending.

(b) Apparatus for the transmission of radiograms exclusively between points in the same State, if the effect of such transmission does not extend beyond the State (so as to interfere with the radio communication of other States), or if the effect of such transmission does not interfere with the reception of radiograms from beyond the State (so as to interfere with the interstate radio communication of that State).

(c) Apparatus for radio communication which has been issued to the Organised Militia by the War Department or to the Naval Militia by the Navy Department and is used for official purposes only.

79. The owner or operator of any apparatus who may be in doubt whether his apparatus, under this paragraph, is exempt from licence may write the facts to the radio inspector for his district before applying for a licence.

80. The apparatus for transmission of radiograms, or signals on any vessel of the United

States not permanently moored, requires a licence.

81. Apparatus for radio communication on land within the jurisdiction of the United States (excluding the Philippine Islands and excluding apparatus of the Government of the United States) must be licensed if—

(a) The apparatus is a means of commercial intercourse among the several States or with foreign nations; or

(b) The apparatus transmits radiograms or signals the effect of which at any time extends beyond the State; or

(c) The apparatus interferes with the receipt of messages in any State from beyond such State.

82. Station licences for the use and operation of apparatus for radio communication under the Act may be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico.

83. Licences can be issued to clubs if they are incorporated or if a member will accept the responsibility for the operation of the apparatus, carrying with it the possibility of being penalised for infraction of the laws.

84. Applications for station licences of all classes should be addressed to the United States Radio Inspector for the district in which the station is located, who will forward the necessary blank forms and information. The limits of the districts and addresses of radio inspectors are given on page 68, paragraph 166.

85. Upon receipt of the forms, properly completed, the radio inspector will make a thorough inspection of the station if practicable.

86. When applications and forms have been properly submitted, ship and amateur stations may be operated in accordance with the laws and regulations governing the class of station for which application for licence has been made, until such time as the application can be acted upon unless the applicant is otherwise instructed and provided temporary official call letters are assigned.

87. General and restricted amateur-station licences are issued directly by radio inspectors. Station licences of all other classes are issued from the office of the Commissioner of Navigation, Department of Commerce. Applications and forms are forwarded by radio inspectors with recommendations by them.

88. Stations desiring to operate different portions of the day under different classifications shall submit application for each service, giving exact hours for each. If approved, each classification will be specified in the licence.

89. The owner of an amateur station may operate his station in accordance with the laws if his application for a licence has been properly filed, but has not been acted upon. An application for an operator's licence must also have been filed, and every effort made to obtain the licence before the station may be operated.

90. "Provisional" station licences are issued to amateurs remote from the headquarters of the radio inspector of the district in which the station is located. These licences are issued as a matter of convenience and record. If, under inspection, the station is found to comply with the law, the inspector will strike out the word "Provisional" and insert the

date of inspection and his signature at the bottom of the licence.

91. If such a station is found not to comply with the law the provisional licence may be cancelled until such time as the apparatus is readjusted to meet the requirements of the law: *Provided, however*, That consideration will be given to any reports of interference filed against such a station.

92. All persons are warned that it is unlawful to operate stations after licences have expired unless application for renewal has been properly made.

93. Owners desiring to renew licences must complete new forms as prescribed for original applications. Amateur-station licences issued on current forms may be renewed by the following endorsement on the back, provided no changes in the equipment or location have been made; otherwise a new licence will be issued: "This licence renewed for one year.

Radio Inspector." The Commissioner of Navigation will be notified of the name and call signal in every case of renewal in this manner.

94. Any person applying for a duplicate licence to replace an original which has been lost, mutilated, or destroyed will be required to submit an affidavit to the Bureau of Navigation through the radio inspector of the district, attesting the facts regarding the manner in which the original was lost. The Commissioner of Navigation will consider the facts in the case and advise the radio inspector in regard to the issue of a duplicate licence or a duplicate will be forwarded through the inspector's office.

95. A duplicate licence will be issued under the same serial number as the original and will be marked "Duplicate" in red across the face.

REGULATIONS GOVERNING RADIO OPERATORS.

GRADES AND REQUIREMENTS.

E 96. (1) Commercial extra first grade; (2) commercial first grade; (3) commercial second grade; (4) commercial cargo grade; (5) commercial temporary permit; (6) experiment and instruction grade; (7) amateur first-grade; (8) amateur second grade.

97. The Service Regulations of the International Convention require that "the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject."

98. Such certificates shall attest the professional efficiency of the operator as regards—

(a) Adjustment of the apparatus and knowledge of its functioning;

(b) Transmission and acoustic reception at the rate of not less than twenty words a minute (Continental Morse) for commercial first-grade operators and not less than twelve words per minute for second-grade operators;

(c) Knowledge of the regulations governing the exchange of wireless telegraph correspondence.

(d) The certificate shall furthermore state that the Government has bound the operator to secrecy with regard to the correspondence.

99. The International Convention has been ratified by the principal maritime nations, dominions and provinces. Radio operators holding valid certificates issued by foreign

Governments which are parties to the convention will be recognised by this department as persons "skilled in the use of such apparatus" within the meaning of the Act, unless in the case of a specific individual there may be special reason to doubt the operator's skill and reliability. Such certificates should be ready at hand for the inspection of radio inspectors or customs officers before the steamer departs from the United States.

100. In the case of a vessel subject to the Act under the flag of any nation not a party to the International Convention, the radio operator, before the departure of the vessel from the United States, must furnish to the inspector evidence that he is "skilled in the use of the apparatus." This evidence shall consist of an examination on board by the radio inspector.

101. *Commercial extra first grade.*—The Department of Commerce will issue a special licence, to be known as commercial extra first grade to radio operators whose trustworthiness and efficient service entitle them to confidence and recognition.

102. These licences will be given consideration by the Civil Service Commission in examinations for positions requiring knowledge of radiotelegraphy, when experience is rated as a part of such examinations.

103. Applicants for the commercial extra first-grade licence must pass a special examination. To be eligible for this examination they must hold commercial first-grade licences, and their certificates of skill in radio communication, issued under the Act of June 24th, 1910, or licences under the Act of August 13th, 1912, must record eighteen months' satisfactory commercial service at sea or at land stations, either or both, during the two years previous to the filing of the application for examination, as shown by endorsement on the licence service records, or other satisfactory evidence, and provided that the applicants have not been penalised for a violation of the radio laws and regulations.

104. A speed of at least thirty words per minute, Continental Morse, and twenty-five words per minute, American Morse (five letters to the word), must be attained. The technical questions and the questions on the radio laws and regulations will be considerably wider in scope than those for commercial first grade, and a higher percentage will be required.

105. All examination papers, including the code test sheets, will be marked and forwarded to the Commissioner of Navigation, with a recommendation by the radio inspector or examining officer. Examination papers will be marked upon the basis of 100, and licences will be recommended only if eighty or better is attained.

106. Licences of this grade will be issued by the Commissioner of Navigation, endorsed by the Secretary of Commerce, and delivered to the successful applicant through the examining officer.

107. *Commercial first grade.*—The applicant must pass a satisfactory examination in—

(a) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wavelength to another.

(b) Transmitting and receiving by ear at a speed of not less than twenty words a minute in Continental Morse (five letters to the word).

(c) Use and care of storage battery or other auxiliary power apparatus.

(d) Knowledge of the international regulations in force applying to radio communication.

(e) Knowledge of the requirements of the Acts of Congress to regulate radio communication (secs. 3, 4, 5, 6, and 7 of the Act of August 13th, 1912).

108. The commercial extra first grade and the commercial first-grade licences qualify holders for employment at any ship or land station of any class.

109. *Commercial second grade.*—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall not be less than twelve words a minute in Continental Morse, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

110. *Commercial cargo grade.*—Section 2 of the Act of July 23rd, 1912, provides: "On cargo steamers, in lieu of the second operator provided for in this Act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life."

111. The examination will be conducted so as to determine the following facts:

(a) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the distress signal (SOS), when included in a list of other words or signals sent slowly (approximately five words a minute).

(b) That the applicant is sufficiently familiar with the Continental Morse Code to recognise radio call letters of the vessel on which he desires to operate when sent slowly and repeated several times.

(c) That the applicant is sufficiently familiar with the type of the receiving apparatus of the vessel on which he desires to operate to determine by buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

112. Examining officers and radio inspectors are authorised to issue a certificate, in the form of an amateur first-grade licence, after examination, to indicate the facts above enumerated in the case of a member of the crew or other person, and experience under this form will be credited by examining officers if the holder later applies for examination for a commercial licence. These licences will be marked "Cargo" in the upper right-hand corner under the serial number.

113. *Commercial temporary permit.*—Section 3 of the Act of August 13th, 1912, provides: "In case of emergency the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the Radio Ship Act of June 24th, 1910."

114. The temporary permit, in the form of a letter to the operator, is to be issued only in cases of emergency and will be valid for one voyage from to beginning, unless the proper licence or properly licensed operator can be obtained en route.

115. The permits should be issued only to persons who the collector of customs has reason to believe are skilled in the use of the apparatus, but have not had the opportunity to present themselves for examination before Government officers authorised to conduct examinations and furnish licences.

116. The collector of customs will forward to the Department of Commerce (Bureau of Navigation) a report covering each temporary permit issued and the reasons for its issue.

117. *Experiment and instruction grade.*—Experimenters and instructors of scientific attainments in the art of radio communication whose knowledge of the radio laws satisfies the radio inspector or the examining officer may obtain this grade licence, provided they are able to transmit and receive in the Continental Morse Code at a speed sufficient to enable them to recognise distress calls or the "keep-out" signals.

118. The operator's licence for this grade is a commercial licence, endorsed by the Secretary of Commerce with a statement of the special purpose for which it is valid.

119. If the applicant qualifies, the radio inspector or examining officer will forward the papers to the Commissioner of Navigation, with his recommendation. If approved, the licence will be properly endorsed by the Secretary of Commerce and delivered to the licensee through the recommending officer.

120. This licence has no reference to the instruction of radio operators as such, but is required by those operating apparatus licensed as experimental stations but who are unable to obtain commercial grade operators' licences.

121. Amateurs before applying for licences should read and understand the essential parts of the International Radiotelegraphic Convention in force and sections 3, 4, 5, and 7 of the Act of August 13th, 1912. The Department recognises that radio communication offers a wholesome form of instructive recreation for amateurs. At the same time its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The Department will not knowingly issue a licence to an amateur who does not recognise and will not obey this principle. To this end the intelligent reading of the International Convention and the Act of Congress is prescribed as the first step to be taken by amateurs. A copy of the radio laws and regulations may be procured for this purpose from the radio inspectors or from the Commissioner of Navigation, Department of Commerce, Washington, D.C., but they are not for public distribution. Additional copies may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C., at a nominal price.

122. *Amateur first grade.*—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus which he wishes to operate and of the regulations of the International Convention and Acts of Congress in so far as they relate to interference with other radio communication and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse at a speed sufficient to enable him to recognise distress calls or the official "keep-out" signals. A speed of at least ten words per minute (five letters to the word) must be attained.

123. *Amateur second grade.*—The require-

ments for the second grade will be the same as for the first grade. The second-grade licence will be issued only where an applicant cannot be personally examined or until he can be examined. An examining officer or radio inspector is authorised in his discretion to waive an actual examination of an applicant for an amateur licence, if the amateur for adequate reasons cannot present himself for examination but in writing can satisfy the examining officer or radio inspector that he is qualified to hold a licence and will conform to its obligations.

EXAMINATIONS.

124. The following requirements and method of conducting examination for radio operators' licences will be adopted at all examining offices.

125. The test shall consist of messages with call letters and regular preambles, conventional signals and abbreviations and odd phrases, and shall in no case consist of simple, connected reading matter. The test will be conducted by means of the omnigraph or other automatic instrument wherever possible.

126. The test shall continue for five minutes at a speed of twenty words, twelve words and ten words per minute, respectively, for the commercial first, second, and lower grades, and to qualify the applicant must receive twenty, twelve, or ten words in consecutive order.

127. The code test sheets written by the applicant will be forwarded to the Commissioner of Navigation with other papers and the speed attained noted in the lower left-hand corner of the first sheet.

128. An applicant will be given credit for the maximum speed he can attain.

129. The practical and theoretical examination shall consist of seven comprehensive questions under the following headings and values:

	Points, maximum value.
(a) Experience	20
(b) Diagram of receiving and transmitting apparatus	10
(c) Knowledge of transmitting apparatus	20
(d) Knowledge of receiving apparatus	20
(e) Knowledge of operation and care of storage batteries	10
(f) Knowledge of motors and generators	10
(g) Knowledge of international regulations governing radio communication and the United States radio laws and regulations	10
	100

130. Seventy-five constitutes a passing mark for the first-grade commercial. Sixty-five constitutes a passing mark for the second-grade commercial.

131. Applicants who fail to attain twenty words in the code test but who attain a mark of between sixty-five and seventy-five in the written examination may be issued second-grade licences, if they can receive at least twelve words per minute.

132. Question (a) shall determine the applicant's practical knowledge and experience in handling radio apparatus. An applicant's experience will be determined largely from the personal question sheet, and from satisfactory letters or references submitted. Expe-

rience, operating first-class amateur apparatus, or the apparatus provided in good training schools, will be given a reasonable value, but applicants who have had experience as apprentices at commercial shore stations or on board vessels will receive higher marks.

133. No applicant who fails to qualify will be re-examined at any examining office within three months from date of the previous examination. All examination papers, whether the applicant qualifies or not, will be forwarded to the Bureau of Navigation for filing as "Operator's record." When the records of the Bureau develop the fact that an applicant has failed to qualify and has applied for re-examination or been re-examined at the same or another office within three months, his existing licence may be suspended or revoked by the Secretary of Commerce. Applicants to whom are issued second-grade licences will not be examined for first-grade licences within three months under the same rule.

PLACES WHERE EXAMINATIONS ARE HELD.

134. (Excised.)

135. Naval radio stations: San Juan, P.R.; Colon, R.P.; Honolulu, H.T.

136. United States Army stations: Fort Omaha, Nebr.; Fort St. Michael, Alaska; Fort Valdez, Alaska.

137. Bureau of Navigation, Department of Commerce, Washington, D.C.

138. Radio inspectors, at their offices and elsewhere, by special arrangement.

139. Additional opportunities for taking the examination will be afforded as may be deemed necessary, and these special dates and places may be ascertained by communication with the Commissioner of Navigation, or nearest radio inspector.

140. All licences, when awarded, will be delivered through the officer who conducted the examination.

141. Examinations for the commercial extra first-grade licences will be held at the following offices only by appointment.

142. (Excised.)

143. United States radio inspectors, custom-houses: New Orleans, La.; San Francisco; Cal.; Seattle, Wash.; Chicago, Ill.; Boston, Mass.; New York, N.Y.; Baltimore, Md.; Detroit, Mich.

144. Commissioner of Navigation, Department of Commerce, Washington, D.C.

145. In special cases, upon application to the Commissioner of Navigation, arrangements may be made for examinations at other points.

APPLICATIONS FOR EXAMINATIONS FOR RADIO OPERATORS' LICENCES, RENEWALS, AND DUPLICATES.

146. An operator's licence may be granted to any person without regard to sex, nationality or age if the applicant can fulfil the requirements for the class of licence desired.

147. Applicants for licences should communicate in writing with the commandants, commanding officers, or officers in charge at navy yards, and army posts, with the Commissioner of Navigation, or radio inspectors, in order to fix the date when they can be examined. (See pars. 134-145.)

148. Commercial licences can only be obtained by personal examination. Where applicants are at remote points or cannot proceed to examining offices, efforts will be made to examine them through radio inspectors when

they are in that vicinity, but special trips cannot be made for that purpose.

149. Amateurs should write to the nearest examining officer in their vicinity (see pars. 134-145) for Form 756 (application for operator's licence) and to the radio inspector in their vicinity for Form 762 (application for licence for land station). If the application for operator's licence is also made to the radio inspector, both applications should be forwarded in the same envelope.

150. Amateur operators at points remote from examining officers and radio inspectors may be issued second-grade amateur licences without personal examination. Examinations for first-grade licences will be given by the radio inspector when he is in that vicinity, but special trips cannot be made for this purpose (see par. 123).

151. Persons holding radio operator's licences, amateur second grade, should make every effort to appear at one of the examination points to take the examination for amateur first-grade licence or higher.

152. Persons holding radio operator's licences of any grade should, before their licences expire, apply to the nearest radio inspector or examining officer for renewal and submit Form 756 in duplicate.

153. Radio operators of the commercial or cargo grades whose licences show on the service records satisfactory service for three months out of the last six months of the licence term may be issued new licences without re-examination. Other operators who submit satisfactory evidence to the examining officer, showing actual operations of radio apparatus for three months during the last six months of the licence term, may be issued new licences without re-examination. All others will be re-examined in the usual manner.

154. Whether or not a new licence is issued, the radio inspector or examining officer will forward one copy of Form 756, properly completed, to the Commissioner of Navigation, Department of Commerce. If a new licence is not issued, the reason therefor will be stated on the back of the form.

155. Any operator applying for a duplicate licence to replace an original which has been lost, mutilated, or destroyed will be required to submit an affidavit to the Bureau of Navigation through the radio inspector or examining officer who issued the original, attesting the facts regarding the manner in which the original was lost. The Commissioner of Navigation will consider the facts in the case and advise the radio inspector in regard to the issue of a duplicate licence. A duplicate licence will be issued under the same serial number as the original and will be marked "Duplicate" in red across the face.

156. Operators' licences are not valid until the oath for the preservation of the secrecy of messages is properly executed before a notary public or other officer duly authorised to administer oaths. Licences must indicate on their faces that the oath has been taken and the officer administering the oath on the back of the licence should sign also in the blank provided on the face.

157. Operators' licences should be framed and posted in the radio room, and licences for stations should be accessible at all times to inspectors.

158. Under the supervision of a licensed operator an apprentice or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails

to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had himself violated the regulations.

159. An individual record is kept in the Bureau of Navigation, Department of Commerce, at Washington, of each licensed operator. Each operator's examination papers and all reports in regard to interference or violations of the radio laws and regulations are filed for reference.

160. Radio operators holding licences of any grade or class and applying for examination for any other grade or class must submit to the examining officer Form 756, in duplicate. If a new licence is issued the licence held by the applicant must be surrendered.

161. Radio operators who pass the examination for a higher grade licence are required to surrender their existing licences, which will be forwarded to the Commissioner of Navigation with the other papers.

162. Operators desiring to retain their expired or cancelled licences may make application therefor to the Commissioner of Navigation.

GENERAL INFORMATION.

ADMINISTRATION AND ADMINISTRATIVE DISTRICTS.

F 163. The Department has established, for the purpose of enforcing, through radio inspectors and others, the acts relating to radio communication and the International Convention, the following districts, with the principal office for each district at the custom house of the port named.

164. Communications for radio inspectors should be addressed as follows, and not to individuals: Radio Inspector, Customhouse, (city), (State).

165. Communications for the Bureau of Navigation should be addressed as follows, and not to individuals: Commissioner of Navigation, Department of Commerce, Washington, D.C.

166. (1) BOSTON, MASS.: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

(2) NEW YORK, N.Y.: New York (county of New York, Staten Island, Long Island, and counties on the Hudson River and including Schenectady, Albany, and Rensselaer) and New Jersey (Counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).

(3) BALTIMORE, MD.: New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.

(4) SAVANNAH, GA.: North Carolina, South Carolina, Georgia, Florida, Porto Rico.

(5) NEW ORLEANS, LA.: Alabama Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.

(6) SAN FRANCISCO, CAL.: California, Hawaii, Nevada, Utah, Arizona.

(7) SEATTLE, WASH.: Oregon, Washington, Alaska, Idaho, Montana, Wyoming.

(8) DETROIT, MICH.: New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (Lower Peninsula).

(9) CHICAGO, ILL.: Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota,

Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

REPORTING OF VIOLATIONS.

167. The regulations established by law, or by the authority of law, or of the International Convention, will be enforced by the Secretary of Commerce through collectors of customs, radio inspectors, and other officers of the Government.

168. The service regulations of the radio-telegraphic Convention in force provide that "no station on shipboard shall be established or worked by private enterprise without authority from the Government to which the vessel is subject." Such authority shall be in the nature of a licence issued by said Government. Stations on foreign ships will be licensed by their Governments respectively. Inspectors will report to the Commissioner of Navigation stations on foreign ships not so licensed.

169. A radio inspector is authorised in exceptional cases to act outside of his district for the convenience of commerce. In such cases he will communicate before or after acting with the inspector in whose district he has acted. Radio inspectors are authorised to communicate directly with collectors of customs and to co-operate with them in the enforcement of the law.

170. Violations of the laws and regulations will be reported to the chief customs officer of the district in which the offence occurs, who will report the case to the Secretary of Commerce (Bureau of Navigation), according to the procedure followed in violations of the navigation laws. Misdemeanours will be reported to the United States district attorney in the usual manner.

171. Collectors of customs and radio inspectors are enjoined that the reports required by paragraph 170 must be precise statements of the facts as the basis for possible proceedings by the United States attorney.

172. Violations by the master of a vessel of the United States of the provisions of the second paragraph of section 1 of the ship act will be reported to the collector of customs directly, and the usual procedure in cases of fines and penalties will be followed.

INSPECTION OF SHIP STATIONS.

173. The radio inspectors and customs officers, as far as practicable shall visit steamers subject to the act before they leave port and ascertain if they are equipped with the apparatus in charge of the operators prescribed by law and regulation.

174. When the radio apparatus is certified as complying with the requirements of law by the competent authorities of a foreign Government, such certificate will be recognised by this Department, but the radio inspector or customs officer may, if he deem it necessary or desirable, satisfy himself that the apparatus is in good working order.

175. Whenever practicable the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the act of July 23rd, 1912, that the apparatus is efficient and in good working order within the meaning of the Act, and if satisfied he shall issue a certificate in the form of Appendix A (form 752). The duplicate of these certificates will be filed with the collector of customs as a record of the radio equipment on vessels sailing from his port.

176. These certificates will be issued only if the inspection is made within two hours of sailing time.

177. For each clearance the master of a steamer coming under the Act of July 23rd, 1912, is required to furnish to the customs officer a certificate in the form in Appendix B (Form 753). Such certificate shall be retained in the files of the collector of customs. Whenever the radio inspector is absent from his home port he will notify the collector of customs, who will arrange for the collection of certificates and survey of equipment.

178. Where a steamer subject to the radio law is without the apparatus and the operators prescribed, or either of them, and is about to attempt to leave port, the radio inspector or customs officer visiting the vessel shall:

(a) Furnish the master with a memorandum (stub of Form 771) of the particulars in respect of which the law has not been complied with and the penalty;

(b) if convenient, notify the vessel's agents or the proper person in charge of the apparatus so that the necessary corrections may be made before sailing.

179. If a steamer clears in violation of the law the radio inspector or customs officer shall submit to the collector of customs of the port a written report, stating the exact nature of the violation, the section of the law violated, and the penalties involved and all of the circumstances in connection therewith which will be of service to the collector and to the Secretary of Commerce in determining what action shall be taken. A copy of the report will be forwarded to the Commissioner of Navigation.

180. Statements should be obtained from operators, ships officers, or other witnesses at the time the violation is discovered and should accompany the report to the collector of customs.

181. The collector of customs will report the case to the Secretary of Commerce in the usual manner as a navigation fine case.

182. Merchant vessels chartered by the United States Government are subject to the Act of August 13th, 1912, in every case, if the radio apparatus is owned and operated by a commercial company.

183. Merchant vessels chartered by the United States Government for the transportation of persons or supplies are subject to the requirements of the ship act (Act of July 23rd, 1912), if the vessel is controlled and operated by the owners. Vessels commanded wholly or in part by Government officers are not subject to the ship act.

184. Government vessels or vessels chartered by the Government are subject to the act of August 13th, 1912, if the radio equipment is owned and operated by private interests.

185. The ship act does not authorise the refusal of clearance in case of violation of its provisions, but specifically provides for the imposition of a fine in a sum not more than \$5,000.

186. The act does not apply to a vessel at the time of entering a port of the United States. Radio inspectors and customs officers may, however, accept as evidence of the efficiency of the operators and the skill of an operator messages shown to have been transmitted and received by him over a distance of at least 100 miles, by day, during the voyage to the United States.

OPERATORS ON FOREIGN VESSELS.

187. In so far as licensed operators are concerned a sharp distinction should be drawn

between the Act of July 23rd, 1912, which requires apparatus and operators for radio communication on steamers and the Act of August 13th, 1912, to regulate radio communication.

188. The Act of July 23rd, 1912, amending the Act of June 24th 1910, is designed to promote safety at sea through the employment of apparatus and operators to transmit and receive distress calls and other calls relating to perils and aids to navigation. It provides that in the case of American and foreign vessels subject to its provisions "the radio equipment must be in charge of two or more persons skilled in the use of such apparatus." This Act does not require that the operators shall be licensed, and the penalty prescribed in section 3 of the Act is not incurred by the master of a vessel whose operators are "skilled in the use of such apparatus," even though they may not be licensed.

189. The Act of August 13th, 1912, is designed to execute in behalf of the United States the International Radiotelegraphic Convention and thus to promote orderly exchanges by radio communication. For this purpose the International Radiotelegraphic Convention (Service Regulations) provides that the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

190. Section 3 of the Act of August 13th, 1912, carries out this provision of the International Convention by providing licences for operators on American vessels. If an unlicensed person serves in charge or in supervision of the use and operation of the apparatus both he and his employer are liable to a fine of not more than \$100 or imprisonment for not more than two months or both. This section and penalty do not apply to operators on foreign ships. But operators on the ships of foreign nations signatory to the International Radiotelegraphic Convention, as shown above, are required to have certificates or licences from their own governments, and if not so certificated, the obligations of the convention have not been observed. The convention in the Service Regulations provides for this situation.

191. The Act of July 23rd, 1912, as stated, requires that on American and foreign ships the operators must be "skilled in the use of such apparatus," but does not require that they must be licensed. To facilitate commerce and simplify administration, operators presenting American licences or foreign certificates are accepted as "skilled in the use of such apparatus," except where there may be special reasons to doubt the operator's skill or reliability. Where operators on American or foreign ships do not have such licences or foreign certificates, radio inspectors or customs officers under the Act of July 23rd, 1912, may accept other competent evidence of skill or may examine such operators.

OFFICIAL INTERNATIONAL LIST OR COAST AND SHIP RADIO STATIONS OF THE WORLD AND STATION RATES.

192. The list of land and ship stations of the United States including amateurs, giving call letters, wavelengths, nature of service, etc., can be procured from the Superintendent of Documents, Government Printing Office, Washington, D.C., at a nominal price.

193. Supplements to this list are issued quarterly and the list is revised annually, as of July 1st. Information concerning amateur stations will not be included in the supplements, but in the annual edition only.

194. The introduction to the list of "Radio Stations of the United States" contains information concerning the assignment of international and amateur call letters.

195. A copy of the Official Berne List, and supplements as issued, are required as a part of the equipment of every station open to general public service.

196. The International List of Radio Stations of the World (edition in English) can be procured from the International Bureau of the Telegraphic Union (Radiotelegraphic Service), Berne, Switzerland.

197. In addition to the information contained in the pamphlet of the United States stations, published by the Bureau of Navigation, the international list shows geographical locations, normal ranges in nautical miles, radio systems and rates.

198. The international list includes the Government and commercial land and ship stations of the United States. The list is divided into three parts. The first part contains a list of ship stations, grouped by countries and arranged alphabetically; the second part contains a list of land stations arranged in the same manner; and the third part contains tables of land line and cable charges from coast radio stations to inland and various other points. In computing the total word rate applicable to a radiogram from a ship station to an inland point or *vice versa*, the three rates must be added. The rates in the international list are stated in francs. For approximate purposes 1 franc equals 20 cents and 5 centimes equals 1 cent. Supplements to the international list will be issued monthly, and will contain new stations and tables of alterations.

199. The International Alphabetical List of Call Letters (stations of the world) is also issued by the international bureau at Berne, and supplements will be issued monthly.

200. Neither the international list proper nor the supplements will contain a list of amateur stations.

201. Inquiries as to the subscription price of these lists should be made direct to the Berne bureau, at the address given above. (See par. 196.) Remittances to Berne should be made by international postal money order.

MISCELLANEOUS INFORMATION.

202. Stations equipped to receive only do not require licences.

203. Operators of receiving stations do not require licences, but *all persons* are required to maintain secrecy in regard to messages, as provided in the Act of August 13th, 1912, nineteenth regulation of section 4.

204. Distances under the radio laws are computed in nautical miles.

205. No fees are charged for any operator or station licence.

206. Licensed stations must be operated by or under the direct supervision of properly licensed operators.

207. Amateur stations within five miles of naval or military stations need not have been in actual operation on or before August 13th, 1912, to obtain a licence for a restricted amateur station.

208. The master of a vessel shall have the

right to censor all messages addressed to or transmitted by a radio telegraph station on board his vessel, but such master shall not divulge to any person (other than the properly authorised officials of the Government, or a competent legal tribunal) or make any use whatever of any message coming to his knowledge through the exercise of such censorship, nor shall the master or any operator divulge to any person (other than the properly authorised officials of the Government, or a competent legal tribunal) or make any use whatever of any message (other than a message of distress) coming to his knowledge and not intended for the said station.

209. The transmission of superfluous signals by any ship or coast station is absolutely prohibited; trials and practices are forbidden except under such circumstances as to preclude the possibility of interference with other stations.

210. No person shall transmit or make a signal containing profane or obscene words or language.

211. Additional or amendatory regulations will be issued from time to time as they may appear necessary.

Radio Service Form 752.

CERTIFICATE OF RADIO INSPECTION.

PART OF

G This is to certify that I have to-day examined the apparatus for radio communication on the s.s. _____, of which _____ is master, about to leave this port for _____, and I have found the same efficient and in good working order, as prescribed by the Act of June 24th, 1910, as amended by the Act of July 23rd, 1912.

(Signed)

Radio Inspector.

(Or)

Customs Inspector.

Radio Service Form 753.

MASTER'S CERTIFICATE OF RADIO APPARATUS.

NOTICE.

H The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars. (Act of July 23rd, 1912.)

PART OF

This is to certify that I have to-day examined the apparatus for radio communication on the S.S. _____, of which I am master, about to leave this port for _____, and I have found the same efficient and in good working order, as prescribed by the Act of June 24th, 1910, as amended by the Act of July 23rd, 1912.

(Signed)

Master.

No.

RADIO SERVICE FORM 753A. RADIO DECLARATION.

(To be submitted in duplicate.)

I NOTICE.—“The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.”—Act of July 23rd, 1912.

Port of _____

Date _____, 19__

This is to certify that the (nationality) _____ s.s. _____ of the (name of company or line) _____ of which I am master, entered this port on _____ 19__ having in crew (number) _____ persons and licensed or certificated to carry (number) _____ passengers; that the said vessel (is/is not) * equipped with radio apparatus as required by the Act of June 24th, 1910, as amended July 23rd, 1912; that the radio station is in charge of (number) _____ properly licensed radio operators and the apparatus is _____

Master or Agent.

in efficient/inefficient † condition.
This form should be filed in duplicate with the Collector of Customs at time of entry, who will furnish one copy to the radio inspector of the district on the date of entry in order that proper inspection may be made of the radio apparatus prior to the clearance of the vessel.

RADIO FORM 753B.

MASTER'S CERTIFICATE OF RADIO APPARATUS.

J NOTICE.—“The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.”—Act of July 23rd, 1912.

CLEARANCE.

Port of _____

This is to certify that I have to-day examined the apparatus for radio communication on the (nationality) _____ s.s. _____ of which I am master, about to leave this port for _____ and I have found the same efficient and in good working order,

* Strike out is or is not as the case may be.

† Strike out efficient or inefficient as the case may be.

as prescribed by the Act of June 24th, 1910,
as amended by the Act of July 23rd, 1912.
(Signed)
Master.

LICENCE FOR GENERAL PUBLIC
SERVICE COAST RADIO STATION.

DEPARTMENT OF COMMERCE.

BUREAU OF NAVIGATION.

RADIO SERVICE.

K Pursuant to the Act to regulate radio
communication, approved August 13th,
1912, , a citizen of the

State of

.....
a company incorporated under the laws of the
State of having
applied therefor, is hereby granted by the
Secretary of Commerce for a period of
on and subject to the restrictions and con-
ditions hereinafter stated and revocable for
cause by him, this licence to use or operate
the apparatus for radio communication
(identified in the schedule hereinafter) located
in the State of city
or town of for the purpose
of transmitting to and receiving from ship
stations and other land stations general public
correspondence, Government and service
correspondence, and distress signals and
messages, at rates of compensation not in
excess of those fixed by the international
agreement to which the Government of the
United States has adhered, which have been
submitted to and approved by the Secretary
of Commerce, as included in the schedule
hereinafter.

2. The use or operation of apparatus for
radio communication pursuant to this licence
shall be subject also to the articles and regu-
lations established by the International
Radiotelegraphic Convention, ratified by the
Senate of the United States and caused to be
made public by the President "to the end that
the same and every article and clause thereof
may be observed and fulfilled with good faith
by the United States and the citizens thereof,
and shall be subject also to such regulations
as may be established from time to time by
authority of subsequent acts and treaties of
the United States.

3. The authority conferred by this licence
is subject to the provisions of the Act of February
4th, 1887, entitled "An Act to regulate
commerce," as amended by the Act of June
18th, 1910, so far as the licensee may be within
the operation of said Act, and except as pro-
vided in the Act of August 13th, 1912, or in
the International Radiotelegraphic Con-
vention and regulations made part thereof,
the station shall transmit all messages offered
by those who tender lawful rates on equal
terms without discrimination, whether as
regards rates, order of transmission, or other-
wise.

4. The licensee shall render to the Secretary
of Commerce such accounts as the Secretary
of Commerce shall direct in respect of all
charges due or payable under the International
Radiotelegraphic Convention in respect of
messages exchanged between the station hereby
licensed and other stations and shall pay to
the Secretary of Commerce, at such times and
in such manner as the Secretary of Commerce
shall direct, all sums which shall be due from
the licensee under such accounts.

5. The apparatus shall at all times while in
use and operation be in charge or under the

supervision of a person or persons licensed
for that purpose by the Secretary of Commerce,
and the operator of the apparatus shall not
wilfully or maliciously interfere with any other
radio communication.

6. The station shall give absolute priority
to signals and radiograms relating to ships
in distress; shall cease all sending on hearing
a distress signal; and, except when engaged in
answering or aiding the ship in distress,
shall refrain from sending until all signals
and radiograms relating thereto are completed.

7. The station during the hours of operation
shall listen-in at intervals of not less than 15
minutes and for a period of not less than two
minutes with the receiver tuned to receive
messages of 300 metres wavelength.

8. The station shall use the minimum amount
of energy necessary to carry out any com-
munication desired, except in case of signals
or radiograms relating to vessels in distress.

9. The station shall exchange radiograms
with any other commercial station and with
any ship station without distinction of the
radio systems adopted by such stations.

10. The station shall not use a transmitter
during the first 15 minutes of each hour, local
standard time, except for distress signals,
whenever the Secretary of Commerce by notice
in writing shall require it to observe a division
of time, pursuant to the Twelfth Regulation
by the Act of August 13th, 1912.

11. The President of the United States in
time of war or public peril or disaster is author-
ised by law to close the station and cause the
removal therefrom of all radio apparatus or
may authorise the use or control of the
station or apparatus by any department of the
Government upon just compensation to the
owners.

12. The Secretary of Commerce and Col-
lectors of Customs or other officers of the
Government authorised by him may at all
reasonable times enter upon the station for
the purpose of inspecting and may inspect
any apparatus for radio communication of
such station and the operation and operators
of such apparatus.

13. The apparatus shall not be altered or
modified in respect of any of the particulars
mentioned in the following schedule, except
with the approval of the Secretary of Com-
merce.

SCHEDULE OF STATION AND APPARATUS.

Location: State, County;

.....; City or Town,

Street,; No.

.....

Geographical location: Latitude, N. °. ' " "

Longitude, W. °. ' " "

Specific hours authorised during which the
station must be open to service (local
standard time):
.....

Power: Transformer input,kw.

Normal day range in nautical miles with ships
at sea.

Time and method, if any, of sending time
signals and hydrographic and meteorolo-
gical radiograms:
.....

Call letters,
.....; Coast charges: per word.

..... minimum per radiogram.

.....; Coast charges: per word.

..... minimum per radiogram.

.....; Coast charges : per word
 minimum per radiogram
 Radiotelegraphic system employed :

 Characteristics of transmitting system :
 Type of spark gap,
 Approximate spark frequency,

 Characteristics of receiving system :
 Type of receiver,
 Wavelength of receiving system : From
meters tometers.
 Antenna : Number of masts,; Height,

 Type of aerial,
 Wires : Number,; Size and
 kind,
 Essential dimensions,

WAVELENGTHS.

The normal sending and receiving wavelength shall be metres, and no other wavelength shall be used for general public correspondence with any foreign ship or foreign coast station, except for long-range public service or purposes other than general public correspondence.

The station shall at all times, except as provided in the seventh paragraph of this licence, be ready to receive messages of such wavelengths as are required by the International Radiotelegraphic Convention; shall be prepared to use two sending wavelengths, one of 300 metres and one of 600 metres, as required by the International Radiotelegraphic Convention in force; and tuning positions on the receiver shall be plainly marked: Provided, That the Secretary of Commerce may, in his discretion, change the limit of wavelength reservations to accord with any international agreement to which the United States is a party.

Sending wave-length.*	Antenna current (amperes).	Logarithmic decrement.	Reading of wavemeter indicating instrument.†	
			Principal wave.	Wave next in energy.
600 metres				
300 metres				
metres				
metres				
metres				

* Underscore normal.

† Type of indicating instrument.....

The station insures rapid exchange with land wire stations of the

(Company.)

(Location telegraph office.)

(Company.)

(Location telegraph office.)

in the following manner :

Satisfactory proof has been furnished that the station was actually operating August 13th, 1912.

This licence will expire on the..... day of....., 19..

Secretary of Commerce.

Commissioner of Navigation.

Washington, D.C. 191 ..

INSPECTIONS.

Date.	Inspector.	Remarks.

No.

LICENCE FOR SHIP RADIO STATION.

DEPARTMENT OF COMMERCE.
 BUREAU OF NAVIGATION.
 RADIO SERVICE.

L Pursuant to the Act to regulate radio communication, approved August 13th, 1912 a citizen of the State of

For long-range public service and for any service other than general public correspondence the station is authorised to use the following additional wavelengths under 600 or over 1,600 metres :

Metres, ; Metres, ; Metres, ;
 Metres, ; Metres, ;

The energy, if radiated by the transmitter in two or more wavelengths as indicated by a sensitive wavemeter, shall not in any one of the lesser waves exceed 10 per cent. of that in the greatest; and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress.

..... a company incorporated under the laws of the State of having applied therefor, is hereby granted by the Secretary of Commerce for a period of on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this licence to use or operate the apparatus for radio communication

(identified in the schedule hereinafter) on the called
(Type of vessel.)
....., a vessel of the
(Name of vessel.)

United States, official number , for the purpose of transmitting to and receiving from other ship stations and land stations general public correspondence, Government and service correspondence, and distress signals and messages, at rates of compensation not in excess of those fixed by the International Agreement to which the Government of the United States has adhered, which have been submitted to and approved by the Secretary of Commerce, as included in the schedule hereinafter.

2. The use or operation of apparatus for radio communication pursuant to this licence shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President "to the end that the same and every article and clause thereof may be observed and fulfilled with good faith by the United States and citizens thereof," and shall be subject also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The authority conferred by this licence is subject to the provisions of the act of February 4th, 1887, entitled "An Act to Regulate Commerce," as amended by the Act of June 18th, 1910, so far as the licensee may be within the operation of said Act, and except as provided in the Act of August 13th, 1912, or in the International Radiotelegraphic Convention and regulations made part thereof, the station shall transmit all messages offered by those who tender lawful rates on equal terms without discrimination, whether as regards rates, order of transmission, or otherwise.

4. The licensee shall render to the Secretary of Commerce such accounts as the Secretary of Commerce shall direct in respect of all charges due or payable under the International Radiotelegraphic Convention in respect of messages exchanged between the station hereby licensed and other stations, and shall pay to the Secretary of Commerce, at such times and in such manner as the Secretary of Commerce shall direct, all sums which shall be due from the licensee under such accounts.

5. The apparatus shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce, except when in case of emergency the Collector of Customs by authority of the Secretary of Commerce shall issue a temporary permit, in lieu of a licence, to the operator. The operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

6. The station shall give absolute priority to signals and radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress shall refrain from sending until all signals and radiograms relating thereto are completed.

7. The station shall be prepared to send the international signal of distress and distress signals on the normal wavelength designated by the International Radiotelegraphic Convention in force with sufficient power to enable them to be received by day over sea

a distance of 100 nautical miles by a ship station equipped with apparatus for sending and receiving equal in all essential particulars to the apparatus of the station herein licensed.

8. The station shall use the minimum amount of energy necessary to carry out any communication desired, except in case of signals or radiograms relating to vessels in distress.

9. The station shall exchange radiograms with any other ship station without distinction of the radio systems adopted by such stations.

10. The station shall not use, except for sending signals of distress or signals and radiograms relating thereto, or when, owing to unusual circumstances, communication can be established only by means of an increase of power, a transformer input exceeding 1 kw., or exceeding $\frac{1}{2}$ kw. when within five nautical miles of a naval or military station.

11. The President of the United States in time of war or public peril or disaster is authorised by law to close the station and cause the removal therefrom of all radio apparatus, or may authorise the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

12. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorised by him may at all reasonable times enter upon the station for the purpose of inspecting, and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

13. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following schedule, except with the approval of the Secretary of Commerce.

SCHEDULE OF STATION AND APPARATUS.

Ship: Name,; Owner,; Home port,; International code letters,
Radio call letters:
Nature of service:
Hours of operation:
Power: Transformer input, kw.
Primary source of power,
Normal day range in nautical miles with other ships at sea,
Ship charge: Per word,; Minimum per radiogram
Per word; Minimum per radiogram
Radiotelegraphic system employed:
Characteristics of transmitting system:
Type of spark gap,
Approximate spark frequency,
Characteristics of receiving system:
Type of receiver,
Wavelength range of receiving system:
From metres to metres
Antenna: Number of masts,; Height,
Type of aerial
Wires: Number,; Size and kind,
Essential dimensions,
Auxiliary apparatus: Type,
Power: Source,; Normal day range with ships,

Sending wave-length.*	Antenna current (amperes).	Logarithmic decrement.	Reading of wavemeter indicating instrument.†	
			Principal wave.	Wave next in energy.
600 metres				
300 metres				
metres				
metres				
metres				
metres				

* Under score normal.

† Type of indicating instrument,

WAVELENGTHS.

The normal sending and receiving wave-length shall be 600 metres, and the station shall be prepared to use two sending wave-lengths, one of 600 metres and one of 300 metres, as required by the International Radiotelegraphic Convention in force; and tuning positions shall be plainly marked: Provided, That the Secretary of Commerce may, in his discretion, change the limit of wavelength reservations to accord with any international agreement to which the United States is a party.

A wavelength of .. metres and the following additional wavelengths not exceeding 600 metres may be employed as authorised by law and treaty:

Metres, .. ; Metres, .. ; Metres ;
Metres, .. ; Metres, .. ; Metres,

Metres, .. ; Metres, .. ; Metres,
The energy, if radiated by the transmitter in two or more wavelengths as indicated by a sensitive wavemeter, shall not in any one of the lesser waves exceed 10 per cent. of that in the greatest; and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress and in sending distress signals when the transmitter may be tuned to create a maximum of interference with a maximum of radiation.

The station in general shall transmit its radiograms to the nearest coast station. The sender shall have the right, however, to designate the coast station through which he desires to have his radiograms transmitted, and his wishes shall be complied with only if the transmission can be effected without interfering with the service of other stations, or the shipboard station shall wait until such coast station shall be the nearest as provided by the International Convention in force.

Satisfactory proof has been furnished that the station was actually operating August 13th, 1912.

This licence will expire on the
day of .. 19 ..

[SEAL.] .. Secretary of Commerce.

Commissioner of Navigation.
Washington, D.C., 19 ..

INSPECTIONS.

Date.	Inspector.	Remarks.

No.

LICENCE FOR LAND RADIO STATION.
Class

DEPARTMENT OF COMMERCE.
BUREAU OF NAVIGATION.
RADIO SERVICE.

M Pursuant to the Act to regulate radio communication, approved August 13th, 1912,
a citizen of the State of .., a company incorporated under the laws of the State of .., having applied therefor, is hereby granted by the Secretary of Commerce for a period of .. on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this licence to use or operate the apparatus for radio communication (identified in the schedule hereinafter) for the purpose of transmitting to and receiving from ship stations and other land stations public correspondence, Government and service correspondence, and distress signals and messages at rates of compensation not in excess of those fixed by the international agreement to which the Government of the United States has adhered, which have been submitted to and approved by the Secretary of Commerce, as included in the schedule hereinafter, or for the purpose of conducting experiments for the development of the science of radio communication or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wavelengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations, the purpose of the station being designated by the classification at the head of this licence.

2. Public correspondence or limited commercial correspondence authorised by this licence shall be limited to certain stations, ships or lines of ships named hereinafter, which designation is authorised in view of the nature of the service and is independent of the radio system employed.

3. The use or operation of apparatus for radio communication pursuant to this licence shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President, and shall be subject also to such regulations as may be established from time to time by authority of subsequent Acts and treaties of the United States, in so far as they apply to the class of station indicated by this licence.

4. The authority conferred by this licence is subject to the provisions of the Act of February 4th, 1887, entitled "An Act to Regulate Commerce," as amended by the Act of June 18th, 1910, so far as the licensee may be within the operation of said Act, and except as provided in the Act of August 13th, 1912, or in the International Radiotelegraphic Convention and regulations made part thereof, the station shall transmit all messages offered by those who tender lawful rates on equal terms without discrimination, whether as regards rates, order of transmission, or otherwise.

5. The licensee shall render to the Secretary of Commerce such accounts as the Secretary of Commerce shall direct in respect of all charges due or payable under the International Radiotelegraphic Convention in respect of messages exchanged between the station hereby licensed and other stations, and shall pay to the Secretary of Commerce, at such times and in such manner as the Secretary of Commerce shall direct, all sums which shall be due from the licensee under such accounts.

6. The apparatus shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

7. The station shall give absolute priority to signals and radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, shall refrain from sending until all signals and radiograms relating thereto are completed.

8. The station shall use the minimum amount of energy necessary to carry out any communication desired, except in case of signals or radiograms relating to vessels in distress.

9. The station shall not use a transmitter during the first fifteen minutes of each hour, local standard time, except for distress signals, whenever the Secretary of Commerce by notice in writing shall require it to observe a division of time, pursuant to the Regulation 12 of the Act of August 13th, 1912.

10. The President of the United States in time of war or public peril or disaster is authorised by law to close the station and cause the removal therefrom of all radio apparatus, or may authorise the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

11. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorised by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

12. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following schedule, except with the approval of the Secretary of Commerce.

SCHEDULE OF STATION AND APPARATUS.

Name of owner
Location : State, ; County,
..... ; City or town,

..... ; Street,
No.

Geographical location : Latitude, N. ;
Longitude, W.

This station is licensed for communication only with the following land stations, ships, or lines of ships :

.....
.....
.....
.....

Specific hours during which the station must/may be open to service (local standard time) :

Power : Transformer input, kw.
Normal day range in nautical miles,

Time and method, if any, of sending time signals and hydrographic and meteorological radiograms :

.....
.....

Call letters,

..... ; Coast charges : per word ;
minimum per radiogram

..... ; Coast charges : per word ;
minimum per radiogram

..... ; Coast charges : per word ;
minimum per radiogram

Radiotelegraphic system employed,
Characteristics of transmitting system :

Type of spark gap,
Approximate spark frequency,

Wavelength range of receiving system :
From metres to metres.

Antenna : Number of masts,
Height,

Type of aerial,
Wires : Number, ; Size and
kind,

Essential dimensions,
.....

WAVELENGTHS.

The normal sending and receiving wavelength shall be metres.

If the station be classified as a coast station, it shall be prepared to transmit or relay distress calls or messages using the distress wavelength as provided by the International Radiotelegraphic Convention in force.

In view of special conditions the station is authorised to use for communication exclusively with stations licensed by the United States the following additional wavelengths under 600 or over 1,600 metres :

Metres, ; Metres, ;
Metres,

The energy, if radiated by the transmitter in two or more wavelengths as indicated by a sensitive wavemeter, shall not in any one of the lesser waves exceed 10 per cent. of that in the greatest; and the logarithmic decrement per complete oscillation in the wave trains shall not exceed two-tenths, except when sending signals or messages relating to vessels in distress.

The station insures rapid exchange with land wire stations at

(Company.)

(Location telegraph office.)

Sending wave-length.	Antenna current (amperes).	Logarithmic decrement.	Reading of wavemeter indicating instrument.*	
			Principal wave.	Wave next in energy.
300 metres				
600 metres				
metres				
metres				
metres				

* Type of indicating instrument

(Company)

(Location telegraph office)

in the following manner:

Satisfactory proof has been furnished that the station was actually operating August 13th, 1912.

This licence will expire on the day of, 19..

[SEAL OF DEPARTMENT OF COMMERCE.]

Secretary of Commerce.

Commissioner of Navigation.

Washington, D.C., 19..

INSPECTIONS.

Date.	Inspector.	Remarks.

LICENCE FOR (General or restricted) AMATEUR RADIO STATION.

DEPARTMENT OF COMMERCE.
BUREAU OF NAVIGATION.
RADIO SERVICE.

N Pursuant to the act to regulate radio communication, approved August 13th, 1912,, a citizen of the State of, having applied therefor, is hereby granted by the Secretary of Commerce, for a period of year, on and subject to the restrictions and conditions hereinafter stated and revocable for cause by him, this licence to use or operate the apparatus for radio communication (identified in the Schedule hereinafter) for the purpose of transmitting private radiograms or signals, notwithstanding the effect thereof extends beyond the jurisdiction of the State or Territory in which the said station is located: *Provided*, That no interference other than may result under the restrictions contained in this licence shall be caused with the radio communication of stations of the Government of the United States or licensed stations.

2. The use or operation of apparatus for radio communication pursuant to this licence shall be subject also to the articles and regulations established by the International Radiotelegraphic Convention, ratified by the Senate of the United States and caused to be made public by the President, and shall be subject

also to such regulations as may be established from time to time by authority of subsequent acts and treaties of the United States.

3. The apparatus shall at all times while in use and operation be in charge of a person or persons licensed for that purpose by the Secretary of Commerce, and the operator of the apparatus shall not wilfully or maliciously interfere with any other radio communication.

4. The station shall give absolute priority to signals or radiograms relating to ships in distress; shall cease all sending on hearing a distress signal; and shall refrain from sending until all the signals and radiograms relating thereto are completed.

5. The station shall use the minimum amount of energy necessary to carry out any communication desired, and the transformer

input shall not exceed ~~one~~ ^{one-half} kilowatt.*

6. The station shall not use a transmitting wavelength exceeding 200 metres.

7. The station shall not use a transmitter during the first 15 minutes of each hour, local standard time, whenever the Secretary of Commerce by notice in writing shall require it to observe a division of the time, pursuant to the Twelfth Regulation of the Act of August 13th, 1912.

8. The President of the United States in time of war or public peril or disaster is authorised by law to close the station and cause the removal therefrom of all radio apparatus, or may authorise the use or control of the station or apparatus by any department of the Government upon just compensation to the owners.

9. The Secretary of Commerce and Collectors of Customs or other officers of the Government authorised by him may at all reasonable times enter upon the station for the purpose of inspecting and may inspect any apparatus for radio communication of such station and the operation and operators of such apparatus.

10. The apparatus shall not be altered or modified in respect of any of the particulars mentioned in the following Schedule except with the approval of a radio inspector or other duly authorised officer of the Government.

SCHEDULE OF STATIONS AND APPARATUS.

Name of owner, Age,

Location: State, ; County,

City or town, ; Street,

No. Official call,

* Strike out "one" if the station be within five nautical miles of a naval or military station; otherwise strike out "one-half."

Name of naval or military station, if within five nautical miles,

Power: Transformer input, W.†

Antenna: Type (T, T, fan, umbrella, etc.),

Height,

Horizontal length, metres and the

(Above ground.)

Wires: Number in vertical part,

In horizontal part,

The normal sending and receiving wavelength shall be metres and the

(Not exceeding 200.)

station is authorised to use the following

additional wavelengths, not exceeding 200

metres: metres, metres.

Satisfactory proof has been furnished that

the station was actually operating August

13th, 1912.

This licence expires on 19..

EDWIN F. SWEET,

Assistant Secretary of Commerce.

E. T. CHAMBERLAIN,

Commissioner of Navigation.

Delivered by

(Radio inspector.)

Place,

Date, 19.... No....

THE UNITED STATES OF AMERICA.

DEPARTMENT OF COMMERCE.

BUREAU OF NAVIGATION.

LICENCE TO RADIO OPERATOR,

COMMERCIAL EXTRA FIRST GRADE.

O This is to certify that has been examined and passed, pursuant to the Radiotelegraphic Convention, in

(a) adjustment, operation and care of apparatus;

(b) transmitting and sound reading at a speed of words a minute, Continental Morse, and words a minute, American Morse;

(c) use and care of storage battery or other auxiliary;

(d) knowledge of international regulations and Acts of Congress to regulate radio communication;

(e) knowledge of United States Naval Radio Regulations;

and is hereby licensed, as required by law, a Radio Operator, Commercial Extra First Grade, for two years.

In testimony of trustworthiness and efficient service as Radio Operator for

months, of which months were service at sea, and of superior knowledge and skill, ascertained by special examination this extra grade licence is granted.

..... Oath of Secrecy executed.

(Examining Officer.)

.....

Secretary of Commerce.

.....

(Title) Notary Public.

.....

Commissioner of Navigation.

Place, Date, 19....

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THE UNITED STATES OF AMERICA.

DEPARTMENT OF COMMERCE.

BUREAU OF NAVIGATION.

LICENCE TO RADIO OPERATOR,

COMMERCIAL* GRADE.

P This is to certify that has been examined and passed, pursuant to the Radiotelegraphic Convention, in

(a) adjustment, operation and care of apparatus;

(b) transmitting and sound reading at a speed of not less than words a minute, Continental Morse;

(c) use and care of storage battery or other auxiliary;

(d) knowledge of international regulations and Acts of Congress to regulate radio communication;

and is hereby licensed as required by law a Radio Operator, Commercial* grade for two years. The candidate's practical knowledge of adjustment was tested on a set of apparatus. His knowledge of other systems is shown below.

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† Not to exceed 1,000; or if the station be within five nautical miles of a naval or military station, not to exceed 500.

*First or Second. ‡Excellent or good.
†Twenty or Twelve. § Insert speed.

No.
THE UNITED STATES OF AMERICA.
 DEPARTMENT OF COMMERCE.
 BUREAU OF NAVIGATION.
 RADIO SERVICE.
LICENCE TO RADIO OPERATOR,
AMATEUR SECOND GRADE.

R This is to certify that has presented satisfactory evidence that he has a knowledge of the adjustment and operation of apparatus and of the regulations of the Radiotelegraphic Convention and the Acts of Congress, in so far as they relate to interference with radio communication and impose certain duties on all grades of operators, sufficient to entitle him to a licence, and he is hereby temporarily licensed as **RADIO OPERATOR, AMATEUR SECOND GRADE**, for the period of eight months or until he has been duly examined.

He has shown that he has knowledge (excellent or good) of the following additional subjects:

(a) General adjustment, operation, and care of apparatus.

(Excellent or good.)

(b) Transmitting and sound reading Continental Morse at a speed of words a minute.

(c) General knowledge of international regulations and Acts of Congress to regulate radio communication.
 (Excellent or good.)

Name of Ship or Land Station.

Period.

Master, Manager, or Superintendent.

.....	From	19..	to	19..
.....	From	19..	to	19..
.....	From	19..	to	19..
.....	From	19..	to	19..
.....	From	19..	to	19..
.....	From	19..	to	19..
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.....	From	19..	to	19..
.....	From	19..	to	19..

Operators must have the service record on the backs of their licences properly completed and signed by the master of their ship or their employer.

NOTICE TO BERNE BUREAU.

S The Minister of Marine of the United States of America has notified to the Berne Bureau that the following information is to be published:—

1. The Departments of the United States Government which are concerned with wireless telegraphy regret that they have not yet been able to make arrangements with the land telegraph of the United States owing to the fact that these are in the hands of commercial companies, and have nothing to do with the Government. The idea was to arrange for the free transmission over the land telegraph, in accordance with Article 14, paragraph 2, of the Rules of Service of the London Convention. The information to be transmitted free of charge was all such as related to the date and the hour of the handing in of radio-telegrams on board ship. But the transmission of such information over land lines being subject to a tax, the Government of the United States cannot, at present, conform strictly to

..... Oath of Secrecy executed :
 (Certifying Officer.)

(Title.) Notary Public.
 Place, Date, 19....
 J. W. ALEXANDER,
Secretary of Commerce.
 E. T. CHAMBERLAIN,
Commissioner of Navigation.

Operator's licences are not valid until the following oath has been executed on the backs of the licences:—

I,, do solemnly swear that I will faithfully preserve the secrecy of all messages coming to my knowledge through my employment under this licence; that this obligation is taken freely, without mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties of the office: So help me God.

(Signature of holder.)

Date of birth,
 Place of birth,
 Sworn to and subscribed before me this day of A.D., 19....

Notary Public.

SERIAL.

SERVICE RECORD.

This is to certify that the holder of this licence has served satisfactorily as radio operator under my orders during the period named.

this rule of the Convention. The declaration of the American delegation contained in Article 2 of the Final Protocol made provision for such a possible outcome, although its exact nature was not actually set forth.

2. Multiple radiotelegrams, such as are mentioned in article 38, paragraph 5, of the Rules of Service, will be accepted as multiple messages in all wireless transmission between ship and shore stations, but all the companies operating land telegraph lines in the United States will consider, and will charge for, a multiple wireless message as consisting of so many individual telegrams as the addresses it bears may indicate.

3. The United States is not a member of the International Telegraphic Union and consequently is not bound to execute the rules laid down in Article 38, paragraph 8, of the London Convention Rules of Service concerning urgent radiotelegrams. The laws of the United States regulating all reciprocal arrangements between the States forbid the use of the privilege, and consequently all telegraph companies will not allow any priority in favour of telegrams for which any additional tax may have been paid.

T An Act to authorise the President of the United States to arrange and participate in an international conference to consider questions relating to international communication.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States be, and he is hereby, requested and authorised in the name of the Government of the United States to call, in his discretion, an international conference to assemble in Washington, and to appoint, by and with the advice and consent of the Senate, representatives to participate therein, to consider all international aspects of communication by telegraph, telephone, cable, wireless telephone, and wireless telegraphy, and to make recommendations with a view to providing the entire world with adequate facilities for international communication on a fair and equitable basis.

SEC. 2.—That the sum of \$75,000, or so much thereof as may be necessary, is hereby

appropriated out of any money in the Treasury not otherwise appropriated, the same to be disbursed under the direction and in the discretion of the Secretary of State for expenses incidental to the conference, including personal services in the District of Columbia notwithstanding the provisions of any other Act: Provided, That no part of said sum shall be used in entertainment or for the purchase of medals and badges.

Approved, December 17th, 1919.

U. S. RADIO COMPASS STATIONS.

U Masters of vessels are invited to make use of the U.S. naval radio compass (direction finding) stations to fix positions. They will be found especially useful during thick weather.

The following U.S. naval shore radio compass stations are now in operation for the purpose of furnishing bearings in the Western Atlantic and the Gulf of Mexico. For the present there will be no charge for bearings furnished.

U. S. ATLANTIC AND GULF COASTS.

Radio Compass Station.	Radio Call.	Position.	
Bar Harbour, Me.	NBD	Lat. 44° 18' 36" N.	Lon. 68° 11' 27" W.
Gloucester, Mass.	NAD	Lat. 42° 35' 19" N.	Lon. 70° 41' 08" W.
Deer Island, Mass.	NAD	Lat. 42° 21' 15" N.	Lon. 70° 57' 30" W.
Cape Cod, Mass.	NAE	Lat. 42° 02' 58" N.	Lon. 70° 04' 32" W.
Surfside, Nantucket, Mass.	NBS	Lat. 41° 14' 42" N.	Lon. 70° 05' 56" W.
Price's Neck, R.I.	NAF	Lat. 41° 27' 06" N.	Lon. 71° 20' 15" W.
Watch Hill, R.I.	NAF	Lat. 41° 18' 21" N.	Lon. 71° 51' 29" W.
Montauk, L.I.	NAH	Lat. 41° 03' 09" N.	Lon. 71° 57' 27" W.
Fire Island, N.Y.	NAH	Lat. 40° 38' 07" N.	Lon. 73° 12' 32" W.
Sandy Hook, N.J.	NAH	Lat. 40° 28' 12" N.	Lon. 74° 01' 06" W.
Mantoloking, N.J.	NAH	Lat. 40° 01' 30" N.	Lon. 74° 03' 10" W.
Cape May, N.J.	NSD	Lat. 38° 56' 41" N.	Lon. 74° 53' 10" W.
Bethany Beach, Del.	NSD	Lat. 38° 32' 45" N.	Lon. 75° 03' 21" W.
Hog Island, Va.	NCZ	Lat. 37° 22' 36" N.	Lon. 75° 42' 37" W.
Cape Henry, Va.	NCZ	Lat. 36° 55' 16" N.	Lon. 75° 59' 51" W.
Cape Hatteras, N.C.	NDW	Lat. 35° 14' 22" N.	Lon. 75° 31' 42" W.
Cape Lookout, N.C.	NAN	Lat. 34° 36' 13" N.	Lon. 76° 32' 15" W.
North Island, S.C.	NZW	Lat. 33° 13' 21" N.	Lon. 79° 11' 06" W.
Morris Island, S.C.	NAO	Lat. 32° 41' 36" N.	Lon. 79° 53' 17" W.
*Pass A Loutre, La.	NBX	Lat. 29° 11' 24" N.	Lon. 89° 02' 26" W.
*Burwood, La.	BNX	Lat. 28° 57' 27" N.	Lon. 89° 23' 10" W.
*Grand Isle, La.	NLI	Lat. 29° 13' 52" N.	Lon. 89° 59' 46" W.

*Limited Service.

NOTE.—The following radio compass station is temporarily out of commission:—Cape Cod, Mass.

U. S. PACIFIC COAST.

The following stations on the Pacific Coast

at San Francisco Harbour entrance are completed and will be placed in commission on or about September 15th, 1920, to give continuous service to shipping:—

Radio Compass Station.	Radio Call.	Position.	
Point Reyes, Calif.	NLG	Lat. 38° 02' 31" N.	Lon. 122° 59' 30" W.
Bird Island, Calif.	NLD	Lat. 37° 49' 24" N.	Lon. 122° 32' 14" W.
Point Montara, Calif.	NLH	Lat. 37° 32' 04" N.	Lon. 122° 31' 06" W.
Farallon Island, Calif.	NPI	Lat. 37° 42' 00" N.	Lon. 123° 00' 00" W.

These four stations will be under the control of Farallon Island radio, but for the present will continue to handle bearings independently as well as a co-ordinated group. Masters of ships are informed that in making use of the San Francisco Harbour entrance group they are requested to call the Farallon Island Station, who will obtain bearings from the remaining

stations in the group and furnish them to the ship, after corrections have been applied.

Where two or more of the foregoing compass stations have the same radio call it indicates that they are connected by wire telegraph to and under the control of a central control station, the radio call being the call of the central control station. When a request for bearings

is made the central control station invariably answers with a bearing from each of the compass stations under its control.

The following signals have been authorised and will be used until further notice:—

SIGNAL.	MEANING.
QTE ?.....	What is my true bearing ?
QTE .....Your true bearing is....degrees	
from.....Radio Compass	
Station.	

To obtain bearings the compass station should be called in the usual manner, using the 800-meter wavelength, the call to be followed by the signal "QTE?," meaning "What is my true bearing?" When told by the compass station to "K" (go ahead) the ship's radio operator should follow the procedure outlined below:—

(a) Transmit the ship's radio call for 30 seconds.

(b) Make dashes, each dash five seconds long, for one minute, with the ship's radio call after each dash.

(c) Terminate with the signal "K" (go ahead).

If satisfactory bearings are obtained the operator at the compass station will call the vessel in the usual manner and reply "QTE," followed by the true bearing in degrees (0 to 359) spelled out in words, and the name of the radio compass station from which the bearing was obtained; otherwise a repetition of the test will be requested.

The ship's operator should acknowledge receipt of the bearings by answering the compass station in the usual manner and repeat, in numerals, the bearings received. This procedure enables all stations concerned to check the bearings.

All U.S. naval shore radio compass stations keep watch and transmit on 800 metres for merchant vessels, and this wavelength must be used for calling and answering and carrying on all communications with these stations.

Attention is invited to the fact that when a single bearing is furnished there is a possibility of an error of 180 degrees, as the operator at the compass station cannot always determine on which side of his station the vessel lies; in such cases the decision is left to the commander of the vessel.

Subject to the foregoing, bearings should be accurate within 2 degrees of an arc. When bearings from three or more compass stations are not over 2 degrees of arc in error, but do not meet at a fixed point, the geometrical centre of the triangle formed by the bearings can generally be taken as the approximate position of the vessel.

The primary object of these stations is to assist in the navigation of vessels during atmosphere of low visibility.

In order that the operation of shore radio compass stations may be checked up, it is requested that a brief report be forwarded to the Director, Naval Communications, Navy Department, Washington, D.C., containing the following particulars:—

1. Name of ship;
2. Name of radio compass station;
3. Date of G.M.T. at which radio bearing was taken;
4. Bearing given by radio compass station;
5. Estimated position of ship at above time and dates by methods other than radio;
6. The probable degree of accuracy of the estimated position;

7. Weather conditions at above time;
8. Remarks, if any;
9. Signature of master or responsible navigating officer.

ACCURACY OF RADIO BEARINGS.

The following information was furnished by the Director of the U.S. Naval Communication Service under date of October 10th, 1919:—

"The reliance that can be placed in bearings furnished by shore radio compass stations will be governed by the following conditions:—

- (a) When two sets of bearings are received which do not agree, a third set should immediately be requested.
- (b) In thick weather, bearings should be requested at least every half-hour.
- (c) Bearings that pass over intervening land or that are tangent to the shore line are not as reliable as those that have a clear sweep over the sea.
- (d) Navigators receiving a set of bearings should immediately investigate the approximate fix indicated and determine whether or not they are being furnished with bearings from the stations that should be most reliable.
- (e) When the position of the ship as indicated by the radio bearing differs materially from the position of dead reckoning, a second set of radio bearings should be requested in order to check the first radio position."

NOTE.—While the Navy Department states that at the present time radio compass bearings have reached a high degree of accuracy, it must be understood that the Government incurs no liability for any consequences resulting from any inaccuracy in the taking or transmission of radio compass bearings. These bearings are provided free of charge, as aids to navigation, to be used at the discretion of the master of the vessel.

PUBLIC RESOLUTION:

No. 48—66TH CONGRESS.

V Joint Resolution to authorise the operation of Government-owned Radio Stations for the use of the general public, and for other purposes.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled: That all land, ship and airship radio stations, and all apparatus therein owned by the United States may be used by it for receiving and transmitting messages relating to Government business, compass reports and the safety of ships.

SEC. 2. That the Secretary of the Navy is hereby authorised, under terms and conditions and at rates prescribed by him, which rates shall be just and reasonable, and which, upon complaint, shall be subject to review and revision by the Interstate Commerce Commission, to use all radio stations and apparatus, wherever located, owned by the United States and under the control of the Navy Department—(a) for the reception and transmission of press messages offered by any newspaper published in the United States, its territories or possessions, or published by citizens of the United States in foreign countries, or by any press association of the United States, and (b) for the reception and transmission of private commercial messages. Provided: That the rates fixed for the reception

and transmission of commercial messages, other than press messages, shall not be less than the rates charged by privately-owned and operated stations for like messages and service: Provided further, That the right to use such stations for any of the purposes named in this section shall terminate and cease as between any countries or localities or between any locality and privately operated ships, whenever privately owned and operated stations are capable of meeting the normal communication requirements between such countries or localities or between any locality and privately operated ships, and the

Secretary of Commerce shall have notified the Secretary of the Navy thereof, and all rights conferred by this section shall terminate and cease in any event two years from the date this resolution takes effect.

SEC. 3. That all stations owned and operated by the Government, except as herein otherwise provided, shall be used and operated in accordance with the provisions of the Act of Congress entitled "An Act to regulate radio communication," approved August 13th, 1912.

Approved, June 5th, 1920.

URUGUAY

THE independence of the Republic of Uruguay, originally part of the Spanish Viceroyalty of Rio de la Plata, and later on a Province of Brazil, was declared on August 25th, 1825, and recognised by Treaty on August 27th, 1828. The constitution was sworn on July 18th, 1830. Legislation is administered by a Parliament of two Houses, the Executive being in the hands of a President elected every four years. The total area of the nineteen departments into which the country is divided is estimated at 72,153 square miles. The capital city is Montevideo, situated on the northern bank of the River Plate Estuary.

CONTROL.

Wireless telegraphy in Uruguay is controlled by the Government, the department in charge being the Ministry of War and Marine. The Government ship stations are also under the control of the Minister of War and Marine. There are no privately owned stations. There are no radiotelegraphic clubs or societies, in fact wireless telegraphy is entirely a Government monopoly.

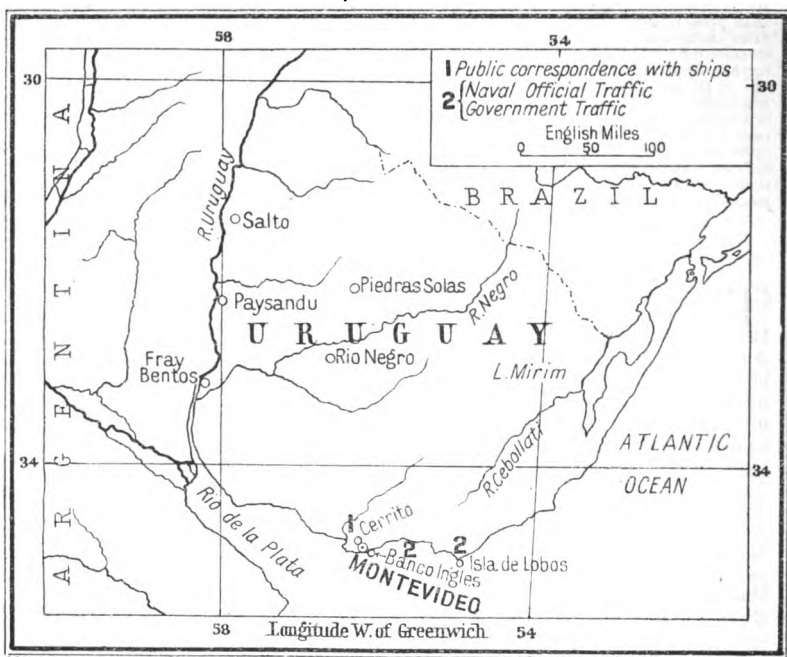
ORGANISATION.

The installation of wireless telegraphy in Uruguay was authorised by a Government Decree dated June 22nd, 1910. This Decree provided for one long-distance station at Montevideo, minimum range 500 miles; two situated respectively at Paso de los Toros and Rivera (Northern Frontier), with minimum range of 372 miles; two respectively situated at Lobos Island and the English Bank, each with minimum range of five miles; besides installations on the various Government vessels. By the end of the year 1911 the service (supplemented by two Military Field Stations) was in working order.

The Montevideo station, opened to the public in December, 1911, and standing on a hill three miles from the river, is the only installation doing international work. Its location is called Cerrito de la Victoria, and the wireless station generally goes by the name of "Cerrito." The installations situated at Rivera and Paso de los Toros are employed solely for military purposes, and only in times of crisis, should a breakdown of the ordinary wired service eventuate, are they used for public messages.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Dr. Arturo Gaye ..	Acting <i>pro tem.</i> as Minister for War	Montevideo
Sr. Bernardo Kay..	Engineer Inspector-General. . .	Calle Pereira 74, Montevideo
Sr. Juan P. Camera	Secretary	Calle Itzaingo 1278, Montevideo
Lieut.-Col. Carlos Du	Chief of Montevideo Station	Montevideo
Pre	(Cerrito)	
Sr. Cesar y Vidal	Chief of Paso de los Toros Station	Paso de los Toros
Pineiro		
Sr. Gualberto Oriel	Chief of Rivera Station	Rivera



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ADMINISTRATION.

The first Decree regulating the subject was issued by the Ministry of War and Marine on September 5th, 1911, and was followed by a decree dated January, 1912. Under its provisions *all ships calling at the ports of the Republic and destined for passenger service are obliged to be fitted with wireless apparatus.*

We print here the text of both the Decrees above referred to:—

A—Decree of September 5th, 1911.

B—Decree of January, 1912.

DECREE OF SEPTEMBER 5TH, 1911.

A 1. The National Wireless Telegraphy Office is under the direct control of the Ministry of War and Marine, with the Engineer Inspector-General as its head.

2. The National Wireless Telegraph Office is in charge of and controls all the radiotelegraphic stations, whether fixed or military movable ones, on vessels or on lighthouses, together with their staff, apparatus and installations.

3. The Inspector-General will at such times and under such circumstances as he thinks proper make visits of inspection of the stations in order to take personal cognisance of their requirements, and he exercises in regard to the staff, whether military or civil, the character of a staff commander.

4. On the occasions of manoeuvres the Inspector-General will designate the country stations which are to take part in accordance

with the instructions he receives as to the requirements of the occasion.

5. It is one of the duties of the National Wireless Telegraph Office to propose to the superior department the construction of fresh stations and to report regarding the means for acquiring the same.

6. The Inspector-General controls the sums received for transmission of telegrams, which sums shall be deposited in the Bank of the Republic to the order of the Minister of War and Marine.

7. The National Wireless Telegraph Office will make contracts with the General Post and Telegraph Office and with the shipping companies to be submitted for approval to the Minister of War and Marine; similarly the office is empowered to draw up with the administrations of the neighbouring States radiotelegraphic agreements with the object of improving and amplifying the international wireless telegraph service, all of which shall be

submitted for approval by the higher department.

8. The Minister of War and Marine will notify the International Office in Berne of the creation of the National Wireless Telegraph Office in Uruguay, so that in future all questions concerning wireless telegraphy in Uruguay may be referred direct to it.

9. The Inspector-General will report quarterly to the Minister of War and Marine regarding the general conditions and working of the service under his charge, and will compile an annual memorandum upon the general work of his department.

DECREE OF JANUARY, 1912.

B 1. Commencing from May 1st of the present year (1912) all the ships carrying passengers between the harbours of the Republic and those of foreign countries shall be fitted with radiotelegraph installations.

2. The said installations shall be designed to receive and transmit telegrams up to a distance of not less than one hundred kilometres on the ships of river navigation, and four hundred kilometres on those of the oceanic navigation.

3. The installations shall be permanently

kept in good conditions of working, and capable of intercommunicating with the stations of the Republic.

4. The stations shall be in charge of persons well acquainted with the use of radiotelegraph apparatus.

5. The service of the stations shall be entirely in accordance with the provisions of the International Radiotelegraph Convention.

6. The agents of the companies will inform, before expiration of the time fixed, the General Inspector of the National Service of Wireless Telegraphy of the characteristics, system, power, etc., of the radiotelegraph apparatus to be fitted on the ships of their companies.

7. The ships which after expiration of the time fixed by Article 1 have not complied with the provisions of this Decree shall not be authorised to carry passengers in the harbours of the Republic.

8. Those ships which do not keep their wireless apparatus in proper working conditions shall be liable to have applied to them the penalty specified in the previous article (7).

9. The General Inspector of the National Service of Wireless Telegraphy is hereby entrusted with seeing that the provisions of this Decree are duly complied with.

VENEZUELA

THE Republic of Venezuela was formed in 1830 by secession from the other members of the Republic of Colombia. The Constitution in force is that of June 13th, 1914. Legislative authority is vested in a Congress of two Chambers, whilst the Executive Power is exercised by a President in conjunction with Cabinet Ministers. The twenty states, two territories and one Federal district of which it is composed cover an area of 398,594 square miles.

The territory included under the Administration of Venezuela is the same as that which was known, at the time South America was a Spanish colony, as "Capitania General de Venezuela," and extends from British Guiana on the east to the Republic of Colombia on the west. Its northern boundary is the Caribbean Sea, and its southern boundary the Republic of Brazil.



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There are included in the Venezuelan territory many islands in the Caribbean Sea, the principal being Margarita, Cubagua, Los Roques, Coche, Tortuga.

The superficial area of the country is 1,432,000 square kilometres.

The form of government is Federal Republican, democratic and representative. The Legislative power is exercised by two Chambers, the Senate and the Deputies, the former being representative of the different states, and the latter being representative of the people. The Federal States have administrative and financial autonomy. The Central Government devotes itself to the general interests of the country.

CONTROL AND ORGANISATION.

Wireless telegraphy has not yet been established as a public service, Trials have been made by individuals, but no permanent installation for public use exists. A small installation for students has been established at Puerto Cabello for the use of a Government School of Wireless Telegraphy. established in June, 1917.

Dr. Luis Soriano, former Director of the Physical Laboratory at the Central University, was the first to make experiments with wireless telegraphy in Venezuela.

Wireless telegraphy is under jurisdiction of the Central Government.

Private concerns are not allowed to erect or work wireless. The Government could at any time grant licences for the establishment of a wireless service by private companies or individuals.

As regards communication within the country, the right to establish public wireless communication is comprised in the State monopoly for any kind of telegraph communication, as indicated in the extract from the Laws relating to Telegraphs and Telephones printed here.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

<i>Official.</i>	<i>Title.</i>	<i>Address.</i>
Dr. Gumersindo Torres ..	Minister of Fomento	Caracas
Dr. C. Gimenez Rebolledo ..	Minister of War	Caracas
General Tobias Uribe ..	Director-General of Telegraphs and Telephones	Caracas
Dr. S. Key Ayala ..	Director of Posts and Telegraphs at the Ministry of Fomento	Caracas

There are no companies manufacturing wireless apparatus or engaged in wireless business of any kind in Venezuela.

There are no wireless societies, clubs, or publications in the country.

The National Government is considering the establishment of radio-telegraphy from two points of view, namely, as regards the working of a high-power station which will guarantee direct communication with Europe and the United States, and also as regards the interior service of the country.

With this end in view, tenders were invited for the construction of a large station and within the period fixed for such tender, viz., October 15th, 1919, three companies competed, but without, however, satisfying all the stipulations, it not being possible to determine exactly the cost of the station on the day it would be handed over, that is to say six months after its good working had been verified; therefore, in agreement with the conditions stipulated for the tenders above-mentioned, none of them was accepted, but immediately afterwards the Ministry of Public Works, to which the telegraph service is subject, was charged to instruct a technician who, as an employee of the Government, should study everything connected with the proposal in order to arrive at a solution which should satisfy the necessities of the country, which is the objective of the National Government.

Allied with the second point of view is the establishment of a small training station which shall serve for the training of operators. This station is of two kilowatts, Marconi system, situated at the high part of Caracas in front of the Bay of Catia which gives easy access to the waves transmitted towards the sea and has been able to maintain communication

with Curaçao and Trinidad. This station has not been brought into service. Three stations are desired, two of five and one of three and a half kilowatts, two of which stations will be established at the towns of Maracay and San Cristobal respectively. A portable military station has also been asked for for the use and instruction of officers of the Army.

By decree dated July 23rd of the present year was created the National School of Radiotelegraphy, an institution destined to provide the country with native operators for the service. The school is directed by Mr. H. R. von Eichwald, a Venezuelan by naturalisation.

For this same purpose three young Venezuelans were sent to the United States to study radiotelegraphy. These young men were granted an allowance by the Government, and have undertaken to return and lend their services to the country.

ADMINISTRATION.

The general subject of telegraphs and telephones is regulated under a law dated June 8th, 1918, and published in the *Gaceta Oficial*, the official organ of the Federal Government.

For the reasons that, as stated above, there are no wireless telegraph stations in Venezuela working regular traffic, no specific reference is made to radiotelegraphy in the Law; but it is covered under Article I, which reserves wireless as a State monopoly. That article runs as follows:—

"The National Government of Venezuela reserve for themselves the exclusive right to establish in the country any system already invented of telegraph and telephonic communication, and it deposes to the Ministry of Fomento the management of such systems."

The rest of the Law refers exclusively to the conditions upon which the Government may allow railway companies and certain other public corporations to establish private lines of telegraphs and telephones.

The Department of Public Works is dealing with the regulations of the service which will be done by Executive Decree, and in accordance with the Law regarding the national telegraphs and telephones which authorises the Executive power to fix the regulations of the telegraphs and telephones for any system invented or to be invented, and also in accordance with the specifications of the Convention of London, 1912.

VIRGIN ISLANDS

(See LEEWARD ISLANDS.)

WEIHAIWEI

(See CHINA, FOREIGN SETTLEMENTS.)

ZANZIBAR

THE island of Zanzibar, covering an area of 640 square miles, lies in 6° south latitude, and is separated from the mainland by a channel 22½ miles across at its narrowest part. It was not until during the sixteenth century that the Arabs of the East Coast succeeded in driving out the Portuguese, and the island was then attached (more or less nominally) to the rulers of Muscat. The supremacy of British interests in the island was recognised by other European States in 1890, Great Britain waiving all claims to Madagascar in favour of France, and ceding Heligoland to Germany.

The ruler of Zanzibar is a native Sultan; but the administration is conducted by a British High Commissioner and Resident.

CONTROL.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
Mr. R. Withycombe, M.B.E. ..	Director of Railways and Electricity	Zanzibar
Mr. S. W. Dyer	Assistant Director of Railways and Electricity	Zanzibar

ORGANISATION.

The Government maintains wireless stations in Zanzibar, Pemba (see map on p. 308) and Mafia.

ADMINISTRATION.

We append herewith the Decree issued by the Sultan in 1909 in regard to wireless.

WIRELESS TELEGRAPHY DECREE.

No. 6 of 1909.

In the name of the Most Merciful God.

It is hereby declared as follows:—

1. (1) No person shall establish any wireless telegraph station or install any apparatus for wireless telegraphy in any place in our dominions except under and in accordance with a licence granted in that behalf by our First Minister.

(2) Every such licence shall be in such form and for such period as our First Minister may determine, and shall contain the terms, conditions and restrictions on and subject to which licence is granted, any such licence may include two or more stations or places.

(3) If any person establishes a wireless telegraph station without a licence in that behalf or installs or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of an offence against this Decree, and on conviction he shall be liable to a fine not exceeding 1,500 rupees, or to simple imprisonment for a term not exceeding twelve months, or to both, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Decree except by the order of our First Minister.

(4) If the Court is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within its jurisdiction without a licence in that behalf, it may grant a warrant to any officer of our police to enter and inspect the station or place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) Our First Minister may make regulations for prescribing the form and manner in which applications for licences under this Decree are to be made and fees payable on the grant of any such licence.

2. Where the applicant for a licence proves to the satisfaction of our First Minister that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted, subject to such special terms, conditions, and restrictions as our First Minister may think proper, but shall not be subject to any rent or royalty.

3. No person shall work any apparatus for wireless telegraphy installed on any ship whilst that ship is in the waters of our dominions otherwise than in accordance with regulations made in that behalf by our First Minister, and our First Minister may by any such regulations impose penalties for the breach of any such regulations not exceeding 150 rupees for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship. Save as aforesaid, nothing in this Decree shall apply to the working of apparatus for wireless telegraphy installed on any foreign ship.

4. The term "ship" includes steamers, sailing ships, dhow, lighters, rafts, and every other form of boat. The expression "wireless telegraphy" means any system of communication by telegraph as defined in "The Indian Telegraph Act, 1883" without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

Provided that nothing in this Decree shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

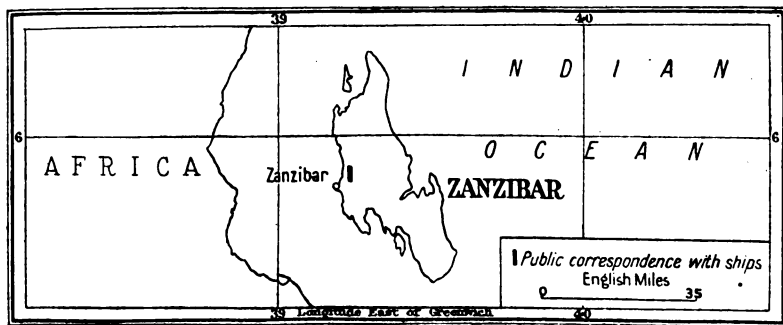
5. This Decree may be cited as "The Wireless Telegraphy Decree, 1909."

Given under our hand and seal this 9th day of February, 1909.

ALI-BIN-HAMUD.

Countersigned under the provisions of Article 47 of "The Zanzibar Order in Council, 1906."

JOHN H. SINCLAIR,
British Agent and Consul-General.



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* * Information received too late for insertion in its appropriate position in this section.

BELGIAN CONGO

(See map on page 120.)

FOUNDED in 1885 by the late Leopold II, King of the Belgians, the Congo "Free State" was placed under his sovereignty. It was subsequently annexed by Belgium under the Provisions of the Treaty of November 28th, 1907. The governing body of the colony consists of fourteen members, eight of whom are appointed by the King of the Belgians, three chosen by the Senate, and three by the Chamber of Representatives. The King is represented in the colony by a Governor-General assisted by several Vice-Governors-General. Its area is estimated at nearly one million square miles, and it possesses a population of about seven millions.

CONTROL.

The wireless telegraphic service of the Belgian Congo possesses a General Directorate at Brussels and a Local Directorate at Stanleyville, in the colony.

OFFICIALS CONTROLLING WIRELESS TELEGRAPHY.

Official.	Title.	Address.
<i>In Brussels—</i>		
Major A. E. M. Wibier ..	Director-General	2, Rue de L'Esplanade, Brussels
M. François Bézerle ..	General Secretary	Do.
M. Raymond Braillard ..	Chief Engineer	Do.
<i>In the Congo—</i>		
M. Fernand Bourguet ..	Director	Stanleyville
M. Duwez	Assistant Director	Do.
M. Mathieu ..	Controllers	Do.
M. Van Cleynenbreugel }		

The network is divided into sections as follows:—

- (1) The section of the Bas-Congo-Kasai, comprising the stations of Banana, Boma, Kinshasa, Lusambo.
- (2) The section of the Equator: Coquilhatville, Basankusu, Umangi, Basoko.
- (3) The section of Stanleyville: Kilo.
- (4) The section of Lualaba: Kindu, Kongola, Kikondja, Lukuga, Elisabethville.

At the head of each section is a chief, assisted by chief operators of stations and constructional engineers.

ORGANISATION.

As a result of his travels in the Congo, King Albert was impressed with the great inconvenience caused by lack of suitable communication between the principal settlements of this vast colony, and decided from that moment to remedy this defect.

At the end of 1910 he drew up a programme in three parts of which the first consisted of linking Boma with Banana as a test. On the results obtained was to be considered the question of instituting another section, that of communication between Boma and Elisabethville, a much more important scheme in view of the fact that this part of the colony had never before made trial with wireless telegraphy. The third point included wireless communication between the Congo and Belgium, at first by means of relay stations, and subsequently direct.

In January, 1911, were installed the first two stations—at Banana and Boma—able to communicate with the coast station at Loango which was, in turn, the terminal point of a submarine cable. The same year the

King charged Mr. Goldschmidt and Captain (now Major) Wibier to instal a chain of stations in such a way as to form a wireless nexus throughout this vast territory. As a result Kinshasa, Coquilhatville, Lisala, Basoko, Stanleyville, Kindu, Kongolo, Kikondja, and Elisabethville stations were erected.

Latterly this network has been augmented, and during the war the stations of Kilo and Lukuga were opened to service. Actually there are fifteen wireless stations now working in the Belgian Congo. In addition there are under construction a station at Buta, in the district of Uele, and a powerful inter-continental station at Kanga (Boma), the latter destined for direct communication with Belgium.

Finally, steps are being taken which it is hoped will enable the three local capitals of Boma, Stanleyville and Elisabethville to directly inter-communicate without resorting to the use of relay stations.

The general traffic dealt with by the system exceeded 500,000 words in 1913, and 5,000,000 words in 1919.

There are no stations utilised for aviation purposes.

The stations at Kinshasa, Stanleyville and Elisabethville intercept press telegrams from Europe, which are distributed to the Colonial officials.

ADMINISTRATION.

The rules under which wireless telegraphy is administered in the colony are those of the Wired Telegraphic Service now in force. None is devoted specially to wireless.

**DIRECTORY OF
THE WORLD'S
WIRELESS
STATIONS**

- (A) Land Stations.**
- (B) Shipboard Stations.**
- (C) International Call Letters.**
- (D) Alphabetical List of
Call Letters.**

The map displays the following locations and features:

- Continents:** NORTH AMERICA, SOUTH AMERICA, AFRICA, ASIA, AUSTRALIA.
- Oceans:** PACIFIC OCEAN, ATLANTIC OCEAN, ARCTIC OCEAN, INDIAN OCEAN.
- Key Locations:** San Francisco, New York, London, Honolulu, Valparaiso, Punta Arenas, Juan Fernandez, Ulanhuui, Llanquihue, Valparaiso, Llanquihue, Punta Arenas, Valparaiso, Llanquihue, Punta Arenas.
- Geographical Features:** Cape Horn, Cape of Good Hope, Cape Agulhas, Cape of Storms, Cape of Good Hope, Cape Agulhas, Cape of Storms.
- Legend:**
 - Services in operation
 - - - Services about to commence
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WIRELESS TELEGRAPH STATIONS OF THE WORLD

A. Land Stations

B. Ship Stations

THE tables of land stations set out in the following pages should be consulted in conjunction with the maps showing the position of wireless telegraph stations inserted in the Laws and Regulations Section (see pp. 79 to 514). The stations have been grouped together under the names of the countries in which they are situated, and these countries have been arranged in alphabetical order; therefore no difficulty is likely to be experienced in locating any particular station. Aviation stations are shown in the apposite section of this volume.

The International Bureau has allotted to signatories of the Convention a list of combinations of letters to be used as call signals for stations proper to the respective countries. The letter limitations of these lists are given in this section, together with the names of the countries with which they are connected.

An alphabetical list of call letters for land and ship stations closes this section. The list indicates upon which page particulars of any station may be found.

Stations of a private or experimental character are omitted, unless exceptional circumstances warrant their inclusion.

Every effort has been made to attain the maximum degree of accuracy possible in these lists, but no responsibility can be accepted, however, in this connection.

The World's Land Wireless Stations open for Correspondence at 31st December, 1919.

	Public Correspon- dence.	Restricted Public Correspon- dence.	Official.	Private.	Special Service.	Total.
Coast Stations	399	* 32	238	19	25	725
Ship Stations	4040	136	1333	252	10	5821
	4439	168	1571	271	35	6546
Internal Communication						77
	Grand Total					6623

A. LAND STATIONS

The following abbreviations are used in the Table of Land Stations below :—(Geographical Position) : E—East Longitude ; W—West Longitude ; N—North Latitude ; S—South Latitude. (Nature of Service) : P G—General Public Correspondence ; P R—Restricted Public Correspondence ; O—Official Correspondence ; P—Private Correspondence ; D F—Direction Finding Service. (Hours of Service) : N—Continuous Service ; X—No fixed working hours.

N.B.—The times shown are G.M.T. unless otherwise stated.

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Min. Charge.	
ABYSSINIA								Frans.	Frans.	
Gambela ..	8° 14' 45" N. 34° 35' 30" E.	GMR	250	Sudan Government	700	P G ..	Weekdays : 0600 to 1300. Frids. & holidays: 0900 to 1100	—	—	
ADEN										
Aden Radio BZF ..	12° 46' 00" N. 45° 02' 00" E.	BZF	1,000	British Admiralty	600 ¹ -2,000 (spark) 4,000, 4,200 4,500 (arc) 600	P R ..	N	0.60	—	¹ Other wavelengths are used for official correspondence. ² The station also exchanges public and official correspondence with Berbera Radio (Brit. Somaliland)
Aden Radio VPI ..	Elephant's Back 12° 46' 00" N. 45° 03' 00" E.	VPI	250	Government ..		P G ³ ..	N	0.60	—	
ADMIRALTY ISLAND										
Manus Radio ..	2° 14' 00" S. 146° 34' 00" E.	VZO	200	Australian Government	300, 600	P G ..	1800 to 0600	0.30 ¹ 0.60 ²	—	¹ For radiotelegrams exchanged with ships subject to the administration of Australia or of New Zealand. ² For radiotelegrams exchanged with ships other than those subject to the administration of Australia or of New Zealand
ALASKA										
Akutan ..	Alutian Islands 54° 08' 00" N. ¹ 169° 48' 00" W.	KMW	50	North Pacific Sea Products Co.	300, 525, 600	— ¹	X	—	—	¹ Only exchanges correspondence with fixed stations
Alitak, Alaska ..	Kodiak Island	KYL	—	Alaska Packers Association.	300, 550, 600	P ..	X	—	—	² Approximately moored vessel
Anchorage, Alaska ..	61° 16' 00" N. ¹ 149° 50' 00" W.	KZY	150	Alaska Engineering Commissioner	300, 600, 750, 1000	O ..	X	—	—	⁴ The long wavelength is used for inland communication
Atka, Alaska ..	—	WJI	—	Bureau of Education	300, 550, 600, 1,650	P R ..	X	—	—	
Becharof, Alaska ..	—	KUDV	—	—	—	PR ..	X	—	—	

Brooks, Alaska	65° 00' 00" N. 145° 30' 00" W.	KIZ	300	Alaska Wireless Telegraph Co.	300, 600	—	—	0930 to 1000 1300 to 1330 1600 to 1630
Brooks, Alaska	65° 36' 54" N. 148° 32' 18" W.	WUV	300	U.S. Army Sigs ..	300, 600	—	—	0930 to 1030 1300 to 1330 1600 to 1630
Bristol Bay, Alaska	58° 45' 00" N. 158° 28' 00" W.	KMP	20	Alaska Packers Association	300, 500, 600	—	—	1600 X
Cape Edwards, Alaska	—	KEY	—	Deep Sea Salmon Co.	—	—	—	—
Chicagof, Alaska	55° 36' 30" N. 136° 09' 20" W.	KWW	50	Joseph T. Bauer	300, 550, 600	P	—	X
Chignik ..	56° 17' 30" N. 158° 31' 30" W.	KHC	300	Alaska Packers Association	300, 500, 600, 1,610	—	—	April to Oct. X
Chisik Is., Alaska	65° 49' 12" N. 144° 04' 18" W.	KUCP	—	Surf Packing Co.	—	P R	—	X
Circle City ..	58° 50' 45" N. 158° 31' 30" W.	WVA	150	U.S. Army ..	600, 1,250	P R	—	0800 to 2000
Clark's Point	—	KHG	200	Alaska Packers Association	300, 400, 500, 600	P ¹	—	X
Cordova, Alaska	60° 27' 45" N. 145° 58' 55" W.	NPA	500	U.S. Navy ..	300, 600	P G	—	N
Craig, Alaska	55° 22' 00" N. 133° 15' 00" W.	WYO	150	U.S. Army ..	600	P R	—	0800 to 2000
Dutch Harbour	—	NPR	250	U.S. Navy ..	300, 600	P G	—	N
Egegik ..	53° 53' 14" N. 166° 32' 08" W.	KMF	—	Libby, McNeill and Libby	300, 500, 600	—	—	—
Ekuk, Alaska	58° 17' 00" N. 152° 39' 00" W.	KMG	300	Libby, McNeill and Libby	300, 500, 600	—	—	—
Fairbanks, Alaska ¹	58° 43' 00" N. 158° 32' 00" W.	WVB	200	U.S. Army ..	1,500	P R	—	0800 to 2000
False Pass ..	64° 30' 17" N. 140° 48' 21" W.	KJL	250	Sockeye Salmon Co	300, 500, 600, 1,700	— ¹	—	1900 to 2200
Fort Egbert	55° 08' 00" N. 162° 15' 00" W.	WVC	200	U.S. Army ..	1,500	P R	—	0800 to 2000
Fort Gibbon, Alaska	64° 46' 19" N. 141° 13' 48" W.	WVD	250	U.S. Army ..	2,000	P R	—	0800 to 2000
Fort St. Michael	62° 10' 16" N. 152° 05' 21" W.	WVE	220	U.S. Army ..	300, 600, 900, 1,200	P G	—	Local time : 0900 to 2100
Fort Yukon, Alaska	63° 29' 15" N. 162° 00' 18" W.	WXX	150	U.S. Army ..	306, 600, 1,050	P R	—	0800 to 2000
Funter, Alaska	66° 30' 00" N. 145° 40' 00" W.	KXK	—	Thinket Packing Co.	—	—	—	—
Hawk Inlet, Alaska	57° 00' 00" N. 135° 00' 00" W.	KKAI	—	P.E. Harris & Co.	—	—	—	—
Holy Cross, Alaska	62° 10' 00" N. 160° 00' 00" W.	WVK	150	U.S. Army ..	300, 600, 1,000	P R	—	0800 to 2000

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ALASKA—contd.	Meridian of Greenwich.									
Iditarod ..	62° 40' 00" N. 158° 00' 00" W.	WXL	200	U.S. Army Sigs ..	300, 500, 800, 1,650	P R ..	0900 to 1900	—	Francs.	
Ikatan, Alaska ..	—	KXW	—	Pacific American Fish Co.	—	—	—	—	—	
Jualin ..	58° 56' 00" N. 135° 00' 00" W.	KJA	100	Jualin Alaska Mines Co.	300, 550, 800, 1,900	P ..	X	—	—	
Juneau, Alaska ..	58° 19' 00" N. 134° 25' 00" W.	NVD	500	North Pacific Sea Products Co.	300, 800	P G ..	N	0.30	—	
Karluk, Alaska ..	Kodiak Island	KVK	—	Alaska Packers Association.	300, 550, 800	P ..	X	—	—	
Ketchikan ..	Alexander Archipelago 55° 20' 45" N. 133° 38' 51" W.	NVH	250	U.S. Navy ..	300, 800	P G ..	N	0.30	—	
King Cove ..	Alaska Peninsula 55° 05' 00" N. 165° 20' 00" W.	KJK	250	Pacific - American Fisheries Co.	300, 800, 1,610	P G ..	1830 to 2130	0.30	—	
Kodiak ..	Hood Island 55° 46' 42" N. 155° 21' 52" W.	NPS	250	U.S. Navy ..	300, 800	P G ..	N	0.30	—	
Koggung ^a ..	Bristol Bay 58° 52' 30" N. 156° 55' 30" W.	KUBX	250	Alaska Fishermen's Packing Co.	300, 450, 800	P G ..	1830 to 2130	0.30	—	
Kotlik ..	Norton Sound 63° 02' 30" N. 153° 22' 22" W.	WVF	100	U.S. Army ..	800, 800	P G ..	0800 to 2000 Closed October to May.	0.25	—	
Kussilof ..	Cook Inlet ..	KKA0	—	Alaska Packers Association.	—	—	—	—	—	
Kvichak ..	59° 03' 00" N. 156° 48' 00" W.	KHB	125	Alaska Packers Association	300, 450, 800	—	X Closed October to April	—	—	
Kwiguk Slough ..	Mouth of Yukon River.	KOV	—	Cardale Packing Co.	550, 800, 1,650	P R ..	—	—	—	
Larsen Bay ..	Kodiak Island 57° 37' 30" N. 153° 39' 40" W.	KHA	200	Alaska Packers Association	300, 500, 800	—	April to Oct. X	—	—	
Latouche, Alaska ..	60° 00' 00" N. 148° 00' 00" W.	KIM	150	Kennecott Copper Corporation	300, 800, 1,650	P G ..	1300 to 1700	0.30	—	
Lazy Bay ..	—	KEPS	—	AlttackPackingCo. Alaska Packers Association.	—	—	—	—	—	
Lazy Bay KYL ..	Kodiak Island	KYL	—	—	—	—	—	—	—	

Libbyville, Alaska ..	59° 05' 45" N, 156° 37' 50" W.	KMT	—	Libby, McNeill and Libby, North Alaska Sal- mon Co.	300, 600, 2,000	P	..	X	—	—
Lockanok, Alaska ..	59° 05' 45" N, 156° 37' 50" W.	KML	30	—	300, 500, 600	—	—	X	—	—
Lost Harbour, Alaska ..	On the Kuskok- win River.	KWS	—	U.S. Army Sigs..	300, 550, 600	P R	..	X	—	—
McGrath, Alaska ..	61° 50' 00" N, 162° 10' 00" W.	WXV	—	—	—	—	—	—	—	—
Marshall, Alaska ..	61° 50' 00" N, 162° 10' 00" W.	KIS	—	Harry G. Watson	550, 1,650	P R	..	X	—	—
Metha Nelson ..	Bristol Bay	KMP	—	—	250, 300, 525, 600	P R	..	X	—	—
Morzhovoi, Alaska ..	—	KJL	—	Sockeye Salmon Co.	300, 550, 600	P	..	X	—	—
Nakat Inlet, Alaska ..	58° 43' 30" N, 157° 00' 00" W.	KDW	—	G. W. Hume and Co.	300, 525, 600, 1,700, 2,000	P R	..	X	—	—
Naknek KHT ..	58° 43' 30" N, 157° 00' 00" W.	KHT	200	Alaska Packers Association.	300, 500, 600, 1,610	—	—	April to October	—	—
Naknek KMK ..	58° 43' 30" N, 157° 00' 00" W.	KMK	300	Naknek Packing Co.	300, 500, 600	—	—	X	—	—
Nelson Lagoon ..	—	KXV	—	Pacific - American Fisheries Co.	550, 600	—	—	—	—	—
Nome, Alaska ..	Norton Sound	WVG	500	U.S. Army	600, 2,500, 3,000	P G	..	Nov. to May, 0800 to 2000, June to October,	0.25	—
Nulato ..	64° 43' 30" N, 158° 06' 48" W.	WVH	500	U.S. Army	1,400	P G	..	0800 to 2000	0.25	—
Nushagak ..	—	KKAE	—	—	—	—	—	—	—	—
Petersburg, Alaska ..	Alexander Archipelago	WVI	100	U.S. Army	500	P G	..	0800 to 2000	0.25	—
Pilot Point, Alaska ..	56° 48' 44" N, 133° 57' 06" W.	KUDT	—	Alaska Packers Association.	—	—	—	—	—	—
Pirate Cove, Alaska ..	—	KOXN	—	Union Fish Co.	—	—	—	—	—	—
Port Althorp ..	—	KLW	—	Deep Sea Salmon Co.	—	—	—	—	—	—
Port Beauchaire ..	—	KWO	—	Beauchaire Pack- ing Co.	—	—	—	—	—	—
Port Chatham ..	—	KWH	—	Alaska Ocean Food Co.	—	—	—	—	—	—
Port Moller ..	55° 50' 00" N, 160° 40' 00" W.	KWR	250	Pacific - American Fisheries	300, 450, 600, 1,610	P G	..	1830 to 2130	0.30	—
Port Walter ..	56° 20' 00" N, 150° 40' 00" W.	KEQ	100	Alaska Herring and Sardine Co.	300, 525, 600, 1,625	P G	..	X	0.30	—
St. George, Alaska ..	Pribilof Islands	NPY	100	U.S. Navy	300, 600	P G	..	N	0.30	—
St. Michael ..	56° 36' 00" N, 160° 43' 00" W.	WVE	200	U.S. Army	600, 900	P G	..	Nov. to May, 0800 to 2000	0.25	—
St. Paul, Alaska ..	63° 40' 00" N, 162° 16' 00" W.	NPQ	250	U.S. Navy	300, 600	P G	..	June to October,	0.30	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ALASKA—contd.										
Saltchuck, Alaska ..	Meridian of Greenwich.	KWQ	—	H. R. Chilberg ..	300, 550, 600	P R ..	X	Frans.	Frans.	¹ The coast charge is reduced to fr. 0.15 per word for correspondence with ships engaged in a regular service between France and Corsica, Algeria, Tunis ² Under construction
Seward, Alaska ..	60° 07' 00" N. ²	NPV	500	U.S. Navy ..	300, 600	P G ..	N	—	—	
Sitka, Alaska ..	140° 24' 00" W.	NPB	250	U.S. Navy ..	300, 600	P G ..	N	0.30	—	
Snag Point ..	52° 02' 48" N. ²	KHF	200	Alaska Packers Association.	300, 400, 500, 600	— ¹	April to October	0.30	—	
	13° 20' 55" W.						X	—	—	
	Alexander Archipelago							—	—	
	59° 02' 30" N. ²							—	—	
	158° 27' 15" W.							—	—	
Sulzer, Alaska ..	64° 15' 00" N. ²	KKAA	—	Charles A. Sulzer	550	P R ..	—	—	—	
Teller ..	166° 20' 00" W.	KWT	—	—	—	— ¹	—	—	—	
Tenekee Inlet	—	KYG	—	—	—	— ¹	—	—	—	
Ugashik, Alaska ..	57° 34' 28" N. ²	KMU	70	Red Salmon Cann. Co.	300, 500, 600	—	X	—	—	
Unga Island, Alaska	152° 35' 00" W.	KVI	500	Alaska Codfish Co.	300, 550, 600 , 1,800	P R ..	X	—	—	
Uyak, Alaska ..	55° 20' 45" N. ²	—	—	—	—	—	—	—	—	
	166° 38' 39" W.							—	—	
	Kodiak Island.							—	—	
	52° 37' 30" N. ²							—	—	
	153° 59' 40" W.							—	—	
Washington Bay, Alaska.	—	KQS	—	Petersburg Packing Co.	—	—	—	—	—	¹ The coast charge is reduced to fr. 0.15 per word for correspondence with ships engaged in a regular service between France and Corsica, Algeria, Tunis ² Under construction
Wrangell ..	Alexander Archipelago	WVJ	100	U.S. Army ..	475	P G ..	0800 to 2000	0.25	—	
	56° 28' 19" N.							—	—	
	132° 30' 12" W.							—	—	
	50° 34' 00" N. ²							—	—	
	139° 46' 00" W.							—	—	
Yakutat, Alaska ..	—	KKA	500	Libby, McNeill and Libby	300, 450, 600	P R ..	—	—	—	
ALGERIA										
Alger T.S.F. ..	To the east of Algiers	FFA	400	Postal, Telegraph and Administration	300, 600	P G ..	N	0.40 ¹	—	
	36° 45' 00" N.							—	—	
Djidjelli-Gonio ..	36° 17' 00" E.	FEJ	—	Navy ..	450	—	N	—	—	
	36° 49' 10" E.							—	—	
	5° 46' 12" E.							—	—	
Oran, Ain el Turck ..	To the west of Oran	FUK	—	Navy ..	—	P G ..	0900 to 2400	—	—	
	35° 45' 00" N.							—	—	
	0° 45' 30" W							—	—	
Saida ² ..	—	—	—	—	—	—	—	—	—	

ANGOLA (Portuguese West Africa)		5° 32' 00" S. 12° 11' 00" E.	CRK ¹	250	Government	800, 900, 1,200	P G	0700 to 1100 1400 to 1700 Sundays and Holidays, 0700 to 1100 do. do. do. do. do. do. do.	0.40	1 Under construction 2 Working provisionally 3 Provisional
Cabinda	..				Government					
Camaxilo ¹	..				Government					
Cangamba ¹	..				Government					
Canguingue ¹	..				Government					
Cuanguar ¹	..				Government					
Cuanhama ¹	..				Government					
Cuito Cuanavale ¹	..				Government					
Dirico ¹	..				Government					
Euroge ¹	..				Government					
Huambo	..				Government					
Loanda ¹	..	12° 45' 00" S. 15° 49' 00" E.	CRH ¹	250	Government	600, 800, 1,200	P G			
Lobito ¹	..	13° 15' 18" S. 12° 18' 50" S.	CRL ¹	750	Government	800, 900, 1,200, 1,800, 2,400	P G		0.40	
Lubango ¹	..	13° 35' 30" E.	CRO ¹	250	Government	800, 900, 1,200	P G		0.40	
Malange ¹	..				Government					
Maquela ¹	..				Government					
Mossamedes	..	15° 11' 13" S. 12° 09' 17" E.	CRM ¹	250	Government	800, 900, 1,200	P G		0.40	
Mexico ¹	..				Government					
Mulondo ¹	..				Government					
Novo Redondo ¹	..	11° 07' 00" S. 13° 54' 00" E.	CRN ¹	250	Government	800, 900, 1,200	P G		0.40	
Posto A ¹	..				Government					
Quanza ¹	..				Government					
Quati ¹	..				Government					
San Thome Island ¹	..	0° 05' 00" N. 6° 33' 00" E.			Government	600, 1,200, 2,400				
Saurimo ¹	..				Government					
ANNAM (Sec FRENCH INDU-CHINA)								Mean Time of the Meridian of Cordoba, ¹ 1200 to 2400		¹ Mean time of the meridian of Cordoba, 4 hours 16 minutes, 48.22 seconds later than Greenwich time ² Time signals transmitted daily. For full particulars see International Time and Weather Signals ³ Argentina ⁴ Lighthouse ⁵ Interior station ⁶ The working of the station is temporarily suspended
Año Nuevo	..	Año Nuevo 54° 39' 30" S. 64° 09' 20" W.	LIG	432	Navy	800, 1,800	O			
Cabo de las Virgenes	..	Entrance to the Strait of Magellan 52° 22' 55" S. 66° 23' 52" W.	LIF	270	Navy	300, 800	P G	N	0.60	6.00
Comodoro Rivadavia	..	Gulf of St. George 45° 51' 20" S. 67° 28' 50" W.	LIP	275	Navy	300, 800	P G	N	0.60	6.00
Corrientes	..	27° 27' 52" S.	LJC	100	—	1,000	O	X		

ANNAM (Sec FRENCH INDU-CHINA)

ARGENTINA

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ARGENTINA—contd.										
Dársena Norte	Meridian of Greenwich. North entrance to the Port of Buenos Aires 34° 35' 00" S. 58° 22' 10" W.	LIA	432	Navy	300, 600, 800	P G ²	N	Francs. 0.60	Francs. 6.00	
Dársena Sud...	South entrance to the Port of Buenos Aires 34° 37' 54" S. 58° 21' 10" W.	LIK	270	Navy	600	O	X	—	—	
Faro Mogotes ³	At the South of the Cap Corrientes 38° 05' 30" S. 57° 32' 51" W. Río de la Plata 35° 10' 30" S. 56° 18' 30" W.	LIC	270	Navy	300, 600	P G ²	N	0.60	6.00	
Faro Recalada ³	Government of Formosa 26° 16' 00" S. 58° 12' 00" W.	LID	216	Navy	300, 600	P G	0900 to 1100 1400 to 1600 2000 to 2400 1200 to 2400	0.60	6.00	
Formosa, Argentina ⁴	34° 11' 09.1" S. 53° 15' 26.8" W.	LIJ	270	Navy	450, 600	O		—	—	
Martin García	31° 42' 00" S. 60° 29' 00" W.	LIX	100	Navy	300, 600	P G	N	0.60	6.00	
Paraná	Province of Entre Ríos 30° 42' 00" S. 59° 38' 00" W.	LJB	300.	—	1,000	O	X	—	—	
Paz, Entre Ríos (La)	Anchored in Canal near to buoy 37, port of Buenos Aires	LII	270	Navy	450, 600	O	1200 to 2400	—	—	
Pontón Estacionario de Practicos Interseccion	—	LIU	30	Navy	300, 600	O ²	X	—	—	
Pontón Practicos Recalada	—	LIV	130	—	300, 600	O	X	—	—	
Pontón Faro, Bahía Blanca ⁵	Entrance to Bahía Blanca 39° 10' 48" S. 61° 30' 27" W.	LIN	50	Navy	300, 600	O	X	—	—	

Posadas Misiones *	27° 22' 00" S. 55° 54' 00" W.	270	Navy	..	..	300, 600	P	1200 to 2400	—	—	—
Puerto Aguirre *	Rio Igazú 25° 35' 00" S. 54° 34' 00" W.	270	Navy	..	..	300, 600	P G	1200 to 2400	—	—	—
Puerto Bermejo	26° 56' 25" S. Near Bahia Blanca	100	—	—	—	700	O	X	—	—	—
Puerto Militar	26° 56' 25" S. Near Bahia Blanca	270	Navy	..	..	300, 600	P G	N	0.60	6.00	—
Punta Delgada, Chubut	38° 53' 30" S. 62° 06' 20" W.	270	Navy	..	..	300, 600	P G	N	0.60	6.00	—
Rio Grande, Tierra del Fuego	42° 46' 00" S. 63° 36' 05" W.	270	Navy	..	..	300, 600	P G	2400 to 1200	0.60	6.00	—
Rio Santiago, Buenos Aires	53° 46' 30" S. 67° 46' 00" W.	270	Navy	..	..	600	O	N	—	—	—
Rosario de Santa Fé	34° 50' 37" S. 57° 51' 53" W.	100	—	—	—	700	O	X	—	—	—
San Julian, Santa Cruz	32° 52' 00" S. 60° 39' 00" W.	270	Navy	..	..	300, 600	P G	N	0.60	6.00	—
Ushuaia ..	49° 17' 26" S. 67° 43' 57" W.	324	Navy	..	..	300, 600	P G	N	0.60	6.00	—
Zarate, Buenos Aires	Tierra del Fuego 54° 48' 50" S. 68° 20' 00" W.	300	Navy	..	..	600, 800	O	N	—	—	—
ASCENSION ISLAND	34° 09' 00" S. 59° 04' 00" W.										—
Ascension ..	7° 59' 00" S. 14° 19' 00" W.	200	British Govern- ment.	..	..	600 ¹	P R	N	0.60	—	—
AUSTRALIAN COM- MONWEALTH											—
Adelaide Radio	South Australia 34° 52' 00" S. 138° 31' 00" E.	450	Government	..	..	300, 450, 600	P G *	N	0.30 ¹ 0.60 ²	—	—
Brisbane Radio	Queensland 22° 25' 40" S. 153° 07' 55" E.	450	Government	..	..	300, 450, 600	P G	N	0.30 ¹ 0.60 ²	—	—
Broome Radio	Western Australia 18° 00' 00" S. 122° 25' 00" E.	450	Government	..	..	300, 450, 600	P G *	N	0.30 ¹ 0.60 ²	—	—
Cooktown Radio	Queensland 15° 28' 00" S. 145° 15' 00" E.	450	Government	..	..	300, 450, 600	P G *	0800 to 1800 ¹	0.30 ¹ 0.60 ²	—	—
Darwin Radio	Northern Territory 12° 27' 00" S. 130° 48' 00" E.	450	Government	..	..	300, 450, 600	P G *	N	0.30 ¹ 0.60 ²	—	—

¹ Other wavelengths are used for official correspondence

¹ For radiotelegrams exchanged with ships subject to the administration of Australia or of New Zealand

² For radiotelegrams exchanged with ships other than those subject to the administration of Australia or of New Zealand

³ Meteorological forecasts are transmitted free of charge by coast stations at the following hours (Melbourne time): Adelaide Radio, 1900 and 2030; Melbourne Radio,

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
AUSTRALIAN COMMONWEALTH—										
<i>contd.</i>										
Esperance Radio ..	Meridian of Greenwich. Australia 33° 51' 00" S. 121° 53' 00" E.	VIE	450	Government ..	300, 450, 600	P G ⁴	N	Francs. 0.30 ¹ / ₁₂ 0.60 ² / ₁₂	Francs. —	1930 and 2100; Sydney Radio 2000 and 2130; Hobart Radio, 2200; Brisbane Radio, 2230 and 2300 ⁴ The station transmits time signals (see International Time and Weather Signals) ⁵ The station transmits weather forecasts when necessary or when requested by vessels ⁶ Connected with the International Telegraph System by wireless through Melbourne Radio ⁷ In the case of radio-telegrams originating at or intended for Flinders Island the charge for local delivery is included in the coast tax ⁸ The working of the station is temporarily suspended ⁹ Connected with the International Telegraph system by wireless through Hobart Radio ¹⁰ Mean time of the meridian 120° E. of Greenwich ¹¹ With wavelength of 600 metres ¹² With wavelength of 2,500 metres ¹³ Connected with the International Telegraph system by wireless through Townsville Radio ¹⁴ Mean time of the meridian 142° 30' E. of Greenwich
Flinders Island Radio ..	Tasmania 40° 01' 00" S. 147° 52' 00" E.	VIL	450	Government ..	300, 450, 600	P G ⁵	0900 to 1800 ¹⁵ Closed Sundays	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Geraldton Radio ..	Western Australia 28° 47' 00" S. 114° 36' 30" E.	VIN	450	Government ..	300, 450, 600	P G ⁵	N	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Hobart Radio ..	Tasmania 42° 32' 00" S. 147° 19' 00" E.	VIH	300	Government ..	300, 450, 600	P G ⁵	0900 to 2300 ¹⁵	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
King Island Radio ..	Tasmania 39° 55' 00" S. 143° 51' 00" E.	VZE	200	Government ..	—	—	—	—	—	
Macquarie Island Radio ..	154° 31' 00" S. 54° 57' 00" E.	VIQ	300	Government ..	300, 450, 600	P G ⁵	1800 to 2400 ¹⁵	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Melbourne Radio ..	Victoria 37° 50' 00" S. 144° 38' 45" E.	VIM	450	Government ..	300, 450, 600	P G ⁵	N	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Misima ..	10° 40' 00" S. 152° 50' 00" E.	—	—	—	—	—	—	—	—	
Mount Gambler Radio ..	South Australia 37° 30' 00" S. 140° 40' 00" E.	VII	400	Government ..	300, 450, 600	P G ⁵	— ¹⁷	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Perth Radio ..	Western Australia 32° 02' 00" S. 115° 51' 00" E.	VIP	400 ¹¹ 1,250 ¹²	Government ..	300, 450, 600 , 2,500	P G ⁵ ¹⁴	N	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Port Moresby ..	117° 09' 00" E. 9° 23' 00" S.	—	—	—	—	—	—	—	—	
Rockhampton Radio ..	Queensland 23° 24' 00" S. 150° 33' 00" E.	VIR	450	Government ..	300, 450, 600	P G ⁵	0600 to 2000 ¹⁸	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	
Roebourne Radio ..	Western Australia 26° 44' 00" S. 117° 12' 00" E.	VIZ	450	Government ..	300, 450, 600	P G ⁵	0800 to 1800 ¹⁸	0.30 ¹ / ₁₂ 0.60 ² / ₁₂	—	

Station	Lat.	Long.	Height	Power	Frequency	Service	Remarks
Samarai	10° 36' 49" S.	152° 36' 49" E.	—	—	—	Government	1000
Sydney Radio	33° 46' 00" S.	151° 00' 00" E.	300, 450, 800, 2,500	—	Government	400 ¹¹ 1,450 ¹²	0.30 ¹¹ 0.60 ¹²
Thursday Island Radio	13° 40' 00" S.	145° 00' 00" E.	300, 450, 800	—	Government	500	0.30 ¹¹ 0.60 ¹²
Townsville Radio	17° 35' 00" S.	145° 00' 00" E.	300, 450, 800	—	Government	1000	0.30 ¹¹ 0.60 ¹²
Woodlark Island	14° 13' 45" S.	157° 15' 00" S.	—	—	Government	—	0.30 ¹¹ 0.60 ¹²
Wyndham Radio	16° 50' 00" S.	146° 50' 00" E.	—	—	Government	—	0.30 ¹¹ 0.60 ¹²
	9° 05' 00" S.	152° 45' 00" E.	300, 450, 800	—	Government	450	0.30 ¹¹ 0.60 ¹²
	15° 35' 00" S.	128° 18' 00" E.	—	—	Government	—	—
AUSTRIA							
Bregenz ¹	—	—	3,750, 5,000, 7,500 (c.w.)	—	Government	—	—
Deutsch-Altenburg	—	—	—	—	Government	—	—
Graz ¹	—	—	—	—	Government	—	—
Innsbruck ¹	—	—	—	—	Government	—	—
Klagenfurt ¹	—	—	—	—	Government	—	—
Lanzerberg	—	—	6,500, 9,000 (c.w.)	—	Government	—	—
Linz ¹	—	—	—	—	Government	—	—
Salzburg ¹	—	—	—	—	Government	—	—
AZORES							
Corvo	39° 40' 10" N.	31° 07' 35" W.	300, 600 ¹	—	Government	65	—
Faial	38° 38' 00" N.	28° 38' 00" W.	300, 600 ¹	—	Government	130	0.40
Flores	39° 27' 35" N.	28° 44' 10" W.	300, 600 ¹	—	Government	130	0.40
Ponta Delgada	31° 08' 10" W.	31° 08' 10" W.	600	—	Admiralty	—	—
Santa Maria	37° 47' 00" N.	25° 40' 00" W.	300, 600 ¹	—	Government	65	0.40
San Miguel	36° 59' 55" N.	25° 08' 20" W.	300, 600 ¹	—	Government	65	0.40
	37° 44' 30" N.	25° 42' 50" W.	300, 600, 900, 1,200, 1,800	—	Government	400	0.40
Terceira	38° 39' 55" N.	27° 07' 34" W.	—	—	Government	—	—

¹ Under construction¹ The station only uses, provisionally, the wavelength of 300 metres² The station only corresponds with the radiotelegraphic stations situated in the Azores³ Greenwich time: October to March, 0800 to 1700; holidays, 0800 to 1300; April to September, 0800 to 1400, 1300 to 1900; holidays, 0800 to 1300⁴ The station also exchanges radiotelegrams with the other coast stations situated in the Azores, within its radius of operation⁵ Used for correspondence with fixed stations

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service	Hours of Service.	Coast Charge.		Remarks.
								Per Wori.	Minimum Charge.	
BAHAMAS	Meridian of Greenwich.						Mean Time of the Meridian 75° W. 0700 to 1500	Francs. 0.30 ¹	Francs. 3.00 ¹	¹ In the case of radio-telegrams originating at or intended for Nassau the local land line charge is included in the coast tax
Nassau, Ba'anas ..	25° 04' 00" N. 77° 22' 00" W.	VPN	400	Government	300, 600, 1,800	P G ..				
BARBADOS (See BRITISH WEST INDIES)										
BELGIAN CONGO										
Banana ..	Lower Congo 6° 06' 22" S. 12° 26' 58" E.	ONA	400- 1,000	Belgian Congo ..	300, 600, 2,250	P G ..	0700 to 1130, 1400 to 1700 ¹ Holidays: 0700 to 1030 1600 to 1700 ¹ 0700 to 1130 1400 to 1700 Sundays and holidays: 0700 to 1030 1600 to 1700 Ditto	0.30	—	¹ The hours are extended on the dates of arrival and departure of the regular steamers ² Inland station ³ Open for public correspondence in the inland service ⁴ Provisional
Basankusu *	District of Lulonga 1° 14' 05" N. 19° 46' 00" E.	OQU	300	Belgian Congo ..	2,100	— ³		—	—	
Basoko *	Aruwimi 1° 14' 00" N. 23° 36' 00" E.	OQO	300	Belgian Congo ..	2,550	— ³		—	—	
Boma *	Lower Congo 5° 51' 00" S. 13° 06' 00" E.	OQB	300	Belgian Congo ..	2,100	— ³	Ditto	—	—	
Bunia-Kilo ¹	1° 42' 00" N. 30° 00' 00" E.	BIA ⁴	300	Belgian Congo ..	4,300	— ³	Ditto	—	—	
Coquilhatville ²	0° 04' 00" N. 18° 18' 00" E.	OQC	300	Belgian Congo ..	3,200	— ³	Ditto	—	—	
Elisabethville ³	Upper Luapula 11° 38' 00" S. 22° 31' 00" E.	OQH	300	Belgian Congo ..	3,000	— ³	Ditto	—	—	
Kikondja *	Tanganika Meero 8° 19' 00" S. 26° 25' 00" E.	OQK	300	Belgian Congo ..	2,400	— ³	Ditto	—	—	
Kindu ¹	Maniema 2° 56' 00" S. 25° 56' 00" E.	OQD	300	Belgian Congo ..	1,950, 2,100	— ³	Ditto	—	—	

Kinshasha ¹	..	Middle Congo 4° 18' 22" S. 15° 21' 37" E.	OGL	300	Belgian Congo ..	3,600	— ¹	Ditto	—	—	—
Kongolo ²	..	Tanganika Moero 5° 23' 00" S. 26° 59' 00" E.	OQG	300	Belgian Congo ..	2,700	— ²	Ditto	—	—	—
Lukula ³	..	Tanganika Moero 5° 35' 40" S. 20° 15' 00" E.	LGA ⁴	300	Belgian Congo ..	3,800	—	Ditto	—	—	—
Lusambo ⁵	..	Sankura 5° 00' 00" S. 23° 05' 00" E.	OQM	300	Belgian Congo ..	4,000	— ⁵	Ditto	—	—	—
Stanleyville ⁶	..	23° 30' 00" N. 0° 30' 00" E.	OQS	300	Belgian Congo ..	3,400	— ⁶	Ditto	—	—	—
Umangi ⁷	..	Bangala 2° 06' 43" N. 21° 26' 34" E.	OQI	300	Belgian Congo ..	2,750	— ⁷	Ditto	—	—	—
BELGIUM											
Anvers ..	..	51° 21' 42" N. 4° 27' 12" E.	OSA	100-150	Government ..	500, 800	P G ..	N	0.40 ¹	4.00 ¹	—
Evère (Brussels)	..	50° 55' 20" N. 0° 20' 32" E.	BAV	—	Army ..	1,400 (W. Telegraphy) 900 (W. Telephony)	—	—	—	—	—
Ostende ..	..	51° 13' 28" N. 2° 55' 13" E.	OST	Day 250 Night 500	Government ..	300, 450, 800	P G ..	N	0.40 ¹	4.00 ¹	—
Uccle (Brussels)	..	50° 47' 55" N. 0° 17' 26" E.	HS	—	Army ..	1,680	—	—	—	—	—
BERMUDA											
Bermuda ..	..	32° 20' 00" N. 64° 45' 00" W.	BZB	200	British Admiralty	800	P G ..	N	0.60	—	—
Somerset Island	..	30° 20' 00" N. 64° 25' 00" W.	BZR	500	British Admiralty	800 ¹	P R ..	N	0.60	6.00	—
BOLIVIA											
Ballivián ..	..	22° 45' 00" S. 62° 11' 00" W.	CPA	Day 204	Government ..	900	—	—	—	—	—
Cachuela Esperanza	..	10° 35' 00" S. 65° 40' 00" W.	CPJ	90	Government ..	1,000	—	—	—	—	—
Cobija ..	..	11° 02' 00" S. 68° 50' 00" W.	CPG	Day 161	Government ..	1,500, 1,800	—	—	—	—	—
Fortin D'Origny ..	..	22° 00' 00" S. 62° 52' 00" W.	CPB	220	Government ..	900	—	—	—	—	—
Fortin Esteros de Patiño ..	..	13° 52' 00" S. 61° 52' 00" W.	CPD	Day 204	Government ..	900	—	—	—	—	—

¹ In the communications with the packet boats of the Belgian State making their passage between Ostende and Dover there is no special coast tax. The total wireless tax is 3 francs for 10 words or less, and 20 centimes for each word over ten

¹ Other wavelengths are used for official correspondence

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
BOLIVIA—contd.										
Guayaramerin	10° 45' 00" S. 65° 25' 00" W.	CPK	60	Government	1,000	—	0600 to 0700, 2200 to 2300	—	—	
Manoa	9° 35' 00" S. 65° 20' 00" W.	CPL	90	Government	1,000	—	0600 to 0700, 2200 to 2300	—	—	
Puerto Suarez ¹	18° 55' 00" S. 57° 50' 00" W.	—	—	Government	—	—	—	—	—	
Riberalta	17° 25' 00" S. 66° 41' 00" W.	CPF	Day 431	Government	2,600, 3,300	—	0700 to 1100, 2005 to 2400	—	—	¹ Under construction
Santa Cruz ¹	17° 40' 00" S. 63° 10' 00" W.	—	—	Government	—	—	—	—	—	
Trinidad	14° 50' 00" S. 64° 45' 00" W.	CPH	300	Government	1,500	—	0700 to 1000, 2000 to 2200	—	—	
Viacha	16° 35' 00" S. 68° 25' 00" W.	CPF	720	Government	2,600, 3,300	—	0800 to 1100, 2005 to 2400	—	—	
Villa Bella	10° 25' 00" S. 65° 25' 00" W.	CPI	90	Government	1,000	—	0600 to 0700, 2200 to 2300	—	—	
Yacuiba	22° 00' 00" S. 63° 45' 00" W.	CPD	600	Government	2,600, 3,300	—	0800 to 1000	—	—	
BORNEO (See BRITISH BORNEO)										
BRAZIL										
Abrolhos	Bahia 17° 57' 30" S. 38° 42' 12" W.	SNN	100	Navy	300	O	—	—	—	¹ In the case of radio-telegrams originating at or intended for the places named against the letter in reference, the charge for transmission between such places and the coast station is included in the coast tax
Amaralina	Bahia 13° 01' 00" S. 38° 28' 00" W.	SPA	400	Government	300, 600, 1,000, 2,000	P G	N	0.60 ¹ (a)	6.00 ¹ (a)	(a) Bahia (San Salvador) (b) Rio de Janeiro (c) Rio de Janeiro or Campos (d) Fernando de Noronha or Recife (Pernambuco)
Anhatomirim	S. Catharina 27° 52' 32" S. 48° 34' 20" W.	SOD	600	Navy	600, 1,200, 2,000	O	—	—	—	
Armação	Rio de Janeiro Bay 22° 52' 57" S. 43° 08' 04" W.	SNW	50	Navy	300	O	—	—	—	
Babytonia	Rio de Janeiro 23° 55' 40" S. 43° 10' 10" W.	SPY	200	Government	300, 600	P G	N	0.60 ¹ (b)	6.00 ¹ (b)	
Belém, Pará	4° 28' 50" S. 48° 30' 00" W.	SPB	750	Government	300, 600, 1,800	P G	N	0.60	6.00	

		SPT	750	Government	300, 800	P G	N	0.60 ¹ (c)	0.60 ¹ (c)	(e) Pelotas or Rio Grande do Sul (f) Santos (g) Olinda or Recife (h) Interior station * This station is open for public correspondence in the inland service * Instructional station * Fifth time belt west of the Greenwich belt * Third time belt west of the Greenwich belt * This station transmits a time signal. For full particulars see International Time and Weather Signals * Fourth time belt west of the Greenwich belt
Cabo de São Thomé	Rio de Janeiro Bay 22° 58' 35" S. 40° 58' 35" W.			Government	600, 3,000	—	1800 to 0600 *	—	—	
Cruzeiro do Sul *	District of Acre 7° 38' 28" S. 72° 36' 15" W.	SQC	400	Government	300	O	—	—	—	
Escola Naval	23° 00' 45" S. 48° 19' 35" W.	SOV	50	Navy	300, 800	O	X	6.00	—	
Escola Radio *	Rio de Janeiro 22° 55' 40" S. 43° 10' 10" W.	SPE	200	—	—	O	—	—	—	
Fernando de Noronha	23° 50' 30" S. 32° 25' 12" W.	SPN	1,000	Navy	300, 800, 1,800	O	N	0.60 ¹ (d)	6.00 ¹ (d)	
Fortaleza da Lage ..	Rio de Janeiro Bay 22° 56' 01" S. 43° 09' 00" W.	PTL	150	Navy	450, 800, 900	O	—	—	—	
Fortaleza do Imbuhy	Rio de Janeiro 22° 57' 02" S. 43° 06' 56" W.	PTI	150	Navy	450, 800, 900	O	—	—	—	
Fortaleza de Santa Cruz	Rio de Janeiro Bay 22° 56' 03" S. 43° 08' 00" W.	PTC	150	Navy	450, 800, 900	O	—	—	—	
Fortaleza de S. João	Rio de Janeiro Bay 22° 56' 40" S. 43° 09' 12" W.	PTJ	150	Navy	450, 800, 900	O	2000 to 2100 *	—	—	
Ilha das Cobras	Rio de Janeiro Bay 22° 52' 00" S. 43° 09' 00" W.	SNI	150	Navy	600	O	—	—	—	
Ilha de Mocangue ..	Rio de Janeiro Bay 22° 52' 15" S. 43° 07' 58" W.	SOQ	50	Navy	300	O	—	—	—	
Ilha do Boqueirão ..	Rio de Janeiro Bay 22° 36' 24" S. 43° 09' 39" W.	SNQ	50	Navy	300	O	—	—	—	
Ilha do Governador ..	Rio de Janeiro Bay 22° 49' 25" S. 43° 07' 58" W.	SOH	800	Navy	600, 1,200, 2,000	O	—	—	—	
Ilha Raza ..	Entrance of the Bay of Rio de Janeiro 23° 03' 40" S. 43° 08' 45" W.	SNZ	150	Navy	600	O	—	—	—	
Juncção ..	Rio Grande do Sul 32° 04' 00" S. 52° 07' 00" W.	SPJ	750	Government	300, 800	P G	N	0.60 ¹ (e)	6.00 ¹ (e)	

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
BRAZIL—contd.	Meridian of Greenwich.									
Labrea, Brazil*	—	SOL	—	Government	—	— ^a	N	Frans.	Frans.	
Ladario ..	Matto Grosso	SNU	—	Navy	—	— ^a	N	—	—	
Mandós ..	Amazonas	SQM	750	Government	2,400, 3,500	— ^a		—	—	
	3° 08' 05" S.									
Mont' Serrat ..	60° 01' 45" W.	SPS	200	Government	300, 600	P G ..	0600 to 2400 ^a	0.60 ¹ (f)	6.00 ¹ (f)	
	Near Santos									
	23° 56' 27" S.									
	46° 19' 34" W.									
Natal, Norte ..	Rio Grande do Norte	SNR	—	Navy	—	O, P G..	N	0.60	6.00	
Nittheroy ..	Rio de Janeiro	PTN	150	Navy	450, 600, 900	O ..	1100 to 1600 2000 to 2100 ^a	—	—	
	22° 52' 52" S.									
	43° 07' 40" W.									
Olinda, Pernambuco	Near Pernambuco	SPO	590	Government	300, 600	P G ..	N	0.60 ¹ (g)	6.00 ¹ (g)	
	8° 00' 35" S.									
	34° 51' 00" W.									
Puerto Velho *	Matto Grosso	SQV	750	Government	2,400, 3,500	— ^a	N	—	—	
	8° 46' 00" S.									
	63° 55' 00" W.									
Quartel General ..	Rio de Janeiro	PTQ	150	Navy	450, 600, 900	O ..	1100 to 1600 2000 to 2100 ^a	—	—	
	22° 54' 25" S.									
	43° 11' 30" W.									
Rio Branco, Acre*	9° 58' 28" S.	SQR	210	Government	1,000, 2,000	— ^a	1800 to 0600 ^a	—	—	
	67° 52' 05" W.									
Santarém, Pará *	2° 24' 48" S.	SQS	400	Government	600, 2,000	— ^a	1800 to 0600 ^a	—	—	
	54° 42' 58" W.									
São Luiz ..	Maranhão	SOM	—	Government	—	O — ^a	N	—	—	
Senna Madureira *	District of Acre	SQN	400	Government	1,500, 3,000	— ^a		—	—	
	8° 03' 57" S.									
	68° 39' 35" W.									
Tarauacá ..	District of Acre	SQT	210	Government	1,500, 3,000	— ^a	1800 to 0600 ^a	—	—	
	8° 20' 55" S.									
	70° 43' 30" W.									
Villa Militar ..	Rio de Janeiro	PTV	150	Navy	450, 600, 900	O ..	1100 to 1600 2000 to 2100 ^a	—	—	
	22° 49' 27" S.									
	43° 24' 52" W.									
Villegaignon ..	Rio de Janeiro Bay	SNV	27	Navy	300	O ..	—	—	—	
	22° 52' 00" S.									
	43° 09' 40" W.									

Station	Latitude	Longitude	SQX	210	Government	Power	Frequency	Time	Remarks
BRITISH BORNEO									
Jesselton	5° 58' 00" N. 116° 04' 00" E.	10° 30' 10" S. 68° 36' 30" W.	VQA	400	Government	300, 450, 600, 1,200, 2,800	P G ¹ ..	0800 to 1100, 1400 to 1700 ² (3000 to 2200) ³	1 The station also communicates with other stations in North Borneo 2 Hong Kong zone time 3 If necessary
Kudat	6° 52' 00" N. 116° 50' 00" E.		VQD	400	Government	300, 450, 600, 1,200, 2,800	P G ¹ ..	0800 to 1100, 1400 to 1700 ² (2000 to 2200) ³	
Sandakan	5° 50' 00" N. 118° 07' 00" E.		VQB	400	Government	300, 450, 600, 1,200, 2,800	P G ¹ ..	0800 to 1100, 1400 to 1700 ² (2000 to 2200) ³	
Tawao	4° 15' 00" N. 117° 54' 00" E.		VQC	400	Government	300, 450, 600, 1,200, 2,800	P G ¹ ..	0800 to 1100, 1400 to 1700 ² (2000 to 2200) ³	
BRITISH EAST AFRICA									
Kismayu	0° 21' 23" S. 42° 35' 30" E.		VQQ	300	Government	600, 900, 1,200	P G ..	0800 to 1700	
Mombasa	4° 02' 31" S. 39° 46' 00" E.		V PQ	350	Government	300, 600, 1,200, 1,800	P G ..	0800 to 1700	
Moyale	—	—	VQU	—	—	—	—	—	
Sankuri	—	—	VQS	—	—	—	—	—	
Serenli	—	—	VQR	—	—	—	—	—	
Wajihel	—	—	VQI	—	—	—	—	—	
BRITISH GUIANA									
Demetara	6° 49' 24" N. 58° 11' 00" W.		BZL	— ¹	British Admiralty	600, 1,800 ² 2,200 ³ 4,200 ³	P R ..	N	1 30 kw. spark and 25 kw. arc sets are fitted 2 Transmitting wave to Trinidad 2,200, receiving 1,800 metres 3 Transmitting and receiving wavelength for Jamaica 4,200 with arc set
BRITISH HONDURAS									
Belize	17° 30' 30" N. 88° 11' 20" W.		VPP	400	Government	600, 1,000	P G ¹ ..	N ²	1 Traffic for the United States and United Kingdom is handled via the United Fruit Company's station at Swan Island 2 This includes the charge for transmission over the telegraph lines of the colony 3 Commercial traffic is handled during schedule hours, viz.:—0340, 0835, 1040, 1500, 1800

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
BRITISH SOMALI-LAND										
Berbera Radio	10° 26' 00" N. 45° 01' 30" E.	VPJ	250	Government	300, 600	P G ¹	0600 to 1800 2000 to 2030	0.60 ²	Francs.	¹ The station also exchanges public and official correspondence with Aden Radio ² In the case of radio-telegrams neither originating at nor intended for Berbera itself, the coast charge is included in the charge for transmission between Aden and Berbera ³ 3 hours in advance of Greenwich time
Bulhar ⁴	10° 22' 00" N. 44° 21' 00" E.	—	—	Government	600	—	—	—	Francs.	⁴ Temporarily closed
Burao	9° 35' 00" E. 45° 33' 00" E.	VQX	—	Government	600	—	—	—	—	Communicates with Berbera and Burao
Hargeisa	9° 30' 00" N. 44° 05' 00" E.	VSA	—	Government	600	— ⁵	—	—	—	⁵ The station only works with fixed stations.
Las Dureh	10° 20' 00" N. 46° 00' 00" E.	VQY	—	Government	600	— ⁵	—	—	—	
BRITISH WEST INDIES										
Barbados	13° 03' 00" N. 59° 36' 34" W.	VPO	200	—	300, 600	P G	N	0.60	—	¹ Other wavelengths are fitted for official use only.
Christiana, Jamaica	17° 57' 41" N. 76° 40' 39.8" W.	BZQ	500	—	600 ¹	P R	N	0.60	—	² In the case of radio-telegrams originating at or intended for Port of Spain (Trinidad), or Scarborough (Tobago), the charge for transmission between the coast station and either of these places is included in the coast charge.
Kingston, Jamaica	18° 00' 08" N. 76° 40' 39.8" W.	VQJ	100	Direct West India Co.	600	P G	X	0.60	6.00	Coast station gives any information on charges for other destinations
St. Lucia	14° 00' 08" N. 61° 00' 11" W.	VQH	—	Government	—	P G	—	0.60	—	
Tobago	11° 10' 40" N. 60° 43' 04" W.	VPM	250	Government	600	P G ⁴	(Local time) 0800 to 1700 2200 to 2215	0.60 ^{2,3}	—	³ The coast charge is reduced to 15 centimes per word with a minimum of 1 fr. 50 c. for messages
Toco, Trinidad	10° 50' 00" N. 60° 55' 00" W.	VQG	150	Government	600	O	—	—	—	
Trinidad	10° 40' 00" N. 61° 30' 00" W.	VPL	400	Government	600	P G	N	0.60 ^{2,3}	—	
Trois Amis	Trinidad 10° 20' 00" N. 61° 25' 00" W.	VPV	350	West India and Panama Co.	850	O	—	—	—	

BULGARIA									
Varna	..	43° 12' 00" N. 27° 55' 00" E.	LZF	270	Government	..	300, 600	P G	0900 to 1200 1400 to 1800 ¹
BURMA (See INDIA).									
CANARY ISLANDS									
Las Palmas	..	28° 00' 00" N. 15° 22' 20" W.	EAL	860	Compania Nacional de T.S.H.	300, 600, 2,540	P G	..	4-50
Teneriffe	..	28° 27' 26" N. 16° 14' 17" W.	EAT	860	Compania Nacional de T.S.H.	300, 600, 2,540	P G	..	4-50
CANADA									
Alert Bay	..	British Columbia (Cormorant Island)	VAF	350	Government, Naval	300, 600, 1,600	P G ¹	..	0.62 ²
American Tickle	..	50° 35' 20" N. 126° 55' 35" W.	VOC	100	Marconi Co. of Canada	600	— ¹³	..	0.60
Barrington Passage	..	53° 41' 00" N. 53° 28' 00" W.	VAL	1500	Government, Naval	1,600 (spark) 4,000 (arc trans.) 2,200 (arc recep.)	P G	..	0.85
Battle Harbour	..	52° 17' 00" N. 55° 36' 00" W.	VOA	150	Marconi Co. of Canada	300, 600	— ¹³	..	0.60
Camperdown, Nova Scotia	..	44° 31' 10" N. 63° 32' 40" W.	VCS	250	Marconi Co. of Canada	300, 600	P G ¹²	..	0.30 ¹⁴
Canso, D F.	..	44° 31' 10" N. 63° 32' 40" W.	VAX	100	—	800	D F ¹⁴ P G	..	—
Cape Bear	..	Prince Edward Island	VCP	150	Marconi Co. of Canada	300, 600	P G ¹	..	0.15
Cape Harrison	..	46° 00' 45" N. 62° 27' 15" W.	VOH	150	Marconi Co. of Canada	600	— ¹³	..	0.60
Cape Lazo	..	58° 03' 00" W. Vancover Island	VAC	350	Government, Naval	300, 600	P G ¹	..	0.60 ¹⁵
Cape Sable	..	49° 42' 20" N. 124° 52' 45" W.	VCU	250	Marconi Co. of Canada	300, 600	P G ¹²	..	0.85 ¹⁶

.. Belize, while that vessel is plying between Trinidad and Tobago

¹ The station also exchanges public and official correspondence with Trinidad

² Eastern European time

³ Weather forecasts transmitted free of charge on request. Messages concerning navigation to any department or officer of the Government handled free of coast tax. Weather and ice reports from captain of a vessel also free of coast charge

⁴ For radiotelegrams sent by or addressed to the commander of a ship relating to the service of the ship the coast tax is reduced to fcs. 0.25 per word. The preamble of such messages should contain the service instruction SB

⁵ Cape Sable and Sable Island communicate with the land telegraph system through Camperdown

⁶ The retransmission charge between these stations and Camperdown is fcs. 0.30 per word. This charge is additional to the ordinary radio and land line rates

⁷ Atlantic standard time, 4 hours later than Greenwich time

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
CANADA—contd.										
Chebucto Head, D F *	Meridian of Greenwich. 44° 30' 01" N. 63° 31' 20" W.	VAV	250	—	800	D F *	—	Francs.	Francs.	* For radiotelegrams sent from or addressed to ships engaged in the local service between Victoria, Vancouver and Seattle, the coast charge is fcs. 0.15 per word. The preamble of such radiotelegrams should contain the service instruction F B.
Clarke City ..	Quebec 50° 11' 00" N. 66° 37' 15" W.	VCK	250	Marconi Co. of Canada	300, 800	P G ¹ ..	N *	0.30	—	
Dead Tree Point ..	British Columbia (Graham Island) 53° 21' 30" N. 131° 55' 55" W.	VAH	200	Government, Naval	300, 800	P G ¹ ..	0800 to 1800 ⁷	0.60 ²	—	
Digby Island ..	British Columbia 54° 17' 05" N. 130° 23' 35" W.	VAJ	250	Government, Naval	300, 800	P G ¹ ..	N	0.60 ²	—	⁸ Independent direction finding station
Domino ..	52° 28' 00" N. 55° 44' 00" W.	VOD	150	Marconi Co. of Canada	600	— ¹²	0800 to 2000 ¹³ ¹⁴	0.60	—	⁹ Pacific standard time, 8 hours later than Greenwich time
Estevan, British Columbia ..	Vancouver Island 48° 22' 05" N. 126° 32' 00" W.	VAE	500	Government, Naval	300, 800	P G ¹ ..	N	0.60 ²	—	¹⁰ The station is open only during the season of navigation, approximately April to December
Fame Point ..	Gulf of St. Lawrence 49° 06' 50" N. 64° 36' 20" W.	VCG	250	Marconi Co. of Canada	300, 800	P G ¹ ..	N *	0.50	—	¹¹ Acts as a retransmitting station for Port Nelson, Manitoba
Father Point ..	Quebec 48° 31' 00" N. 68° 27' 40" W.	VCF	350	Marconi Co. of Canada	300, 800	P G ¹ ..	N *	0.15	—	¹² With the wavelength of 1,800 metres
Glace Bay ..	Nova Scotia 46° 00' 30" N. 50° 55' 30" W.	GB	3,125	Marconi Co. of Canada	9,000	— ¹¹	N	—	—	¹³ Transatlantic commercial traffic. Communicates with Clifton (United Kingdom)
Gonzales Hill ..	British Columbia, Victoria 48° 24' 50" N. 125° 48' 25" W.	VAK	250	Government, Naval	300, 800	P G ¹ ..	N	0.60 ^{2,4}	—	¹⁴ The station is open for public correspondence in the inland service
Grady, Labrador ..	53° 48' 00" N. 56° 23' 00" W.	VOE	150	Marconi Co. of Canada	600	— ¹⁵	0800 to 2000 ¹³ ¹⁴	0.60	—	¹⁵ Atlantic standard time, four hours later than Greenwich time
Grindstone Island ..	Gulf of St. Lawrence, Magdalen Islands 47° 23' 00" N. 61° 54' 20" W.	VCN	200	Marconi Co. of Canada	300, 800	P G ¹ ..	0800 to 2000 ⁴	0.30	—	¹⁶ The station is only open during the season of navigation, approximately July to October
Grosse Isle, Quebec ..	70° 40' 05" W.	VCD	100	Marconi Co. of Canada	300, 800	P G ¹ ..	N	0.15	—	¹⁷ The station transmits weather forecasts free of charge on request by ship stations

Halifax Dockyard ..	VAA	Government ..	Co. of	300, 600	O ..	—	—	—
Harrington, Quebec	VCJ	150	Marconi Co. of	300, 600	P G ¹ ..	N *	0.30	—
Heath Point ..	VCI	250	Marconi Co. of	300, 800	P G ¹ ..	N *	0.30	—
Holton, Labrador ..	VOG	150	Marconi Co. of	600	— ¹⁸	0800 to 2000 ^{18 14}	0.60	—
Ikeda Head ..	VAI	250	Government, Naval	300, 800	P G ¹ ..	0800 to 24 ^{10 7}	0.60 *	—
Kingston, Ontario ..	VBH	350	Marconi Co. of	300, 800, 1,600	P G ¹ ..	N	0.15	—
Le Pas, Manitoba ..	VBM	600	Government ..	900, 1,800, 2,400	O *	X	—	—
Lurche Lightship ..	VDR	100	Department of Marine	300	O ..	X	—	—
Midland, Ontario ..	VBC	350	Marconi Co. of	300, 800, 1,600	P G ¹ ..	N	0.15	—
Mokkovik ..	VOI	150	Marconi Co. of	600	— ¹⁸	0800 to 2000 ^{18 14}	0.60	—
Montreal ..	VCA	350	Marconi Co. of	300, 800	P G ¹ ..	N *	0.15	—
Newcastle ..	VAN	—	—	—	P	—	—	—
North Sydney, Nova Scotia	VCO	100	Marconi Co. of	300, 800	P G ¹ ..	N	0.30	—
Pachena ..	VAD	500	Government, Naval	300, 800	P G ¹ ..	N	0.60 *	—
Partridge Island ..	VCV	250	Marconi Co. of	300, 800	P G ¹ ..	N	0.30	—
Pictou, Nova Scotia	VCQ	100	Marconi Co. of	300, 800	P G ¹ ..	Dec. to April, N	0.15	—
Point Armour ..	VCL	150	Marconi Co. of	300, 600	P G ¹⁸ ..	May to November N	0.30	—
Point Edward ..	VBE	350	Marconi Co. of	300, 800, 1,600	P G ¹ ..	N	0.15	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Mini- mum Charge.	
CANADA—contd.										
Point Grey ..	Meridian of Greenwich. British Columbia, near Vancouver. 49° 15' 35" N. 123° 15' 30" W.	VAB	150	Government, Naval	300, 800	PG ¹ ..	N	Frans. 0.60 ¹²	—	
Port Arthur, Ontario	49° 15' 35" N. 80° 13' 30" W.	VBA	350	Marconi Co. of Canada	300, 800 , 1,600	PG ¹ ..	N	0.15	—	
Port Burwell ..	80° 13' 45" W. Ontario 42° 38' 35" N. 82° 37' 15" W.	VBF	350	Marconi Co. of Canada	300, 800 , 1,600	PG ¹ ..	N	0.15	—	
Port Nelson, Manitoba	42° 38' 35" N. Hudson Bay 57° 03' 20" N. 96° 34' 20" W.	VBN	150 600 ¹⁸	Government ..	300, 800 , 1,800	PG ..	N	0.60	—	
Quebec ..	46° 48' 25" N. 71° 12' 25" W.	VCC	100	Marconi Co. of Canada	300, 800	PG ¹ ..	N	0.15	—	
Sable Island ..	43° 56' 20" N. 66° 02' 45" W.	VCT	300	Marconi Co. of Canada	300, 800	PG ¹² ..	N	0.85 ¹²	—	
Sault Ste. Marie, Ontario	46° 31' 05" N. 80° 16' 30" W.	VBB	350	Marconi Co. of Canada	300, 800 , 1,600	PG ¹ ..	N	0.15	—	
Smoky Tickle ..	54° 26' 30" N. 56° 11' 00" W.	VOF	150	Marconi Co. of Canada	600	— ¹³	0800 to 2000 ^{13 14}	0.60	—	
Three Rivers, Quebec	46° 20' 45" N. 71° 33' 25" W.	VCB	150	Marconi Co. of Canada	300, 800	PG ¹ ..	N ¹²	0.15	—	
Tobermory, Ontario	43° 15' 35" N. 80° 38' 40" W.	VBD	350	Marconi Co. of Canada	300, 800 , 1,600	PG ¹ ..	N	0.15	—	
Toronto VBG ..	43° 38' 40" N. 79° 29' 30" W.	VBG	350	Marconi Co. of Canada	300, 800 , 1,600	PG ¹ ..	N	0.15	—	
Triangle Island ..	British Columbia 50° 51' 50" N. 120° 01' 50" W.	VAG	450	Government, Naval	300, 800	PG ¹ ..	N	0.60 ¹²	—	
Venison Island ..	55° 46' 00" N. 53° 14' 00" W.	VGB	100	Marconi Co. of Canada	600	— ¹³	0800 to 2000 ^{13 14}	0.60	—	
CAPE VERDE ISLANDS										
St. Vincente Island ¹ (Mindello)	16° 54' 00" N. 24° 59' 00" W.	—	—	—	600, 1,000, 1,200, 1,600, 2,000, 2,400, 600-1,000, 1,600	—	—	—	—	¹ Under construction
St. Thiago Island ¹ (Praia)	18° 00' 00" N. 23° 40' 00" W.	—	—	—	—	—	—	—	—	

Station	Coordinates	Elevation	Frequency	Service	Power	Remarks	Notes
Sal Island ¹ ..	16° 49' 00" N. 22° 56' 00" W.	—	—	—	300, 600, 1,000	—	—
Boa Vista Island ¹ ..	16° 05' 00" N. 22° 50' 00" W.	—	—	—	300, 600, 1,000	—	—
CEYLON							
Colombo Radio	6° 55' 07" N. 79° 52' 53" E.	390	VPB	Government ..	300, 800	PG ..	0.60
Matara ..	5° 59' 00" N. 80° 32' 00" E.	500	BZE	British Admiralty	600 (spark) 4,000 (arc)	PR ..	0.60
CHILE							
Ancud ..	41° 32' 00" S. 73° 52' 00" W.	—	—	Government ..	—	—	—
Antofagasta	23° 27' 35" S. 70° 31' 30" W.	400	CCB	Government ..	300, 800, 1,300 ¹	PG ..	0.60
Arica ..	18° 29' 00" S. 70° 20' 35" W.	400	CCA	Government ..	800, 1,300 ¹	O ..	—
Coquimbo ..	29° 37' 35" S. 71° 20' 00" W.	400	CCO	Government ..	800, 1,300 ¹	O ..	0.60
Evangelistas ..	52° 47' 00" S. 74° 50' 00" W.	—	—	Government ..	—	—	—
Huafu ..	43° 33' 37" S. 74° 39' 30" W.	250	CCH	Government ..	800, 900 ¹	PR ..	0.60
Juan Fernandez	Juan Fernandez Island	250	CCJ	Government ..	800, 1,600	PR ..	0.60
Llanquihue ..	33° 37' 30" S. 78° 49' 50" W.	2,000	CCL	Government ..	3,500, 5,000	— ³	—
Mocha ..	18° 23' 12" S. 73° 53' 44" W.	300	CCM	Government ..	600	PR ..	0.60
Punta Arenas ..	53° 10' 00" S. 70° 50' 00" W.	2,000	CCP	Government ..	3,500, 5,000	— ³	—
Raper ..	Peninsula of Taytao	250	CCR	Government ..	800, 1,600	PR ..	0.60
Talcahuano ..	36° 44' 00" S. 73° 05' 35" W.	700	CCT	Government ..	300, 800, 1,300 ¹	PG ..	0.60
Valparaiso ..	33° 01' 06" S. 71° 38' 06" W.	300	CCV	Government, Naval	300, 800, 1,300 ¹	PG ⁴ ..	0.60

¹ The long wave is used for inland correspondence
² Four hours later than Greenwich time
³ The station is open for inland correspondence
⁴ The station transmits a weather report at 0100 and a time signal at 1300 (Greenwich time). (For full particulars see International Time and Weather Signals—Chile.)
⁵ For reception
⁶ For transmission

Chilian Standard Time¹

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
CHINA										
	Meridian of Greenwich.							Frans.	Frans.	
Canton	23° 10' 00" N. 113° 20' 00" E.	XNP	650	Government	600, 1,200, 1,600, 2,100	P G ¹ ..	0800 to 2200 ²	0.50 ³	—	¹ Communicates with other coast stations in China
Foochow	26° 07' 00" N. 119° 18' 00" E.	XOW	650	Government	600, 1,200, 1,600, 2,100	P G ¹ ..	0800 to 2200 ³	0.50 ⁴	—	² Time of the east coast of China (8 hours in advance of Greenwich time)
Kalgan	40° 45' 00" N. 115° 20' 00" E.	XQL	650	Government	1,200, 1,600, 2,100, 3,000	O ..	N	—	—	³ In the case of messages originating at or intended for Canton or Shamsen, the local land line charge is included in the coast tax
Kashgar ⁴	Sinking Eastern Turkistan	—	—	Government	—	—	—	—	—	⁴ In the case of messages originating at or intended for Canton or Shamsen, the local land line charge is included in the coast tax
Lan-Chau-Fu (Urga)	Kansu	—	—	Government	—	—	—	—	—	⁵ In the case of messages originating at or intended for Foochow the local land line charge is included in the coast tax
Peking NPP ⁷	39° 54' 50" N. 116° 22' 00" E.	NPP	150	U.S. Navy	300, 600	O ..	N	— ⁶	—	⁶ No charge for relaying messages
Peking XPK	39° 54' 00" N. 116° 27' 00" E.	XPK	650	Government	600, 1,200, 1,600, 2,100	O ..	N	—	—	⁷ Operated by the United States Marine Corps
Quang-Tcheou-Wan	21° 05' 34" N. 110° 27' 45" E.	FWA	500	French Government	300, 600, 1,800	P G ..	0700 to 1100 ¹⁰ 1400 to 1700	0.25	2.00	⁸ In the case of messages originating at or intended for Foochow the local land line charge is included in the coast tax
Shanghai	31° 15' 00" N. 121° 20' 00" E.	XSH	200	Government	600	P G ¹ ..	0800 to 2200 ⁹	0.50 ³	—	⁹ Under construction
Shanghai-Zikawei	31° 11' 38" N. 121° 25' 46" E.	FFZ	500	Soc. Française Radio-électrique (of Paris)	600, 1,000, 1,800	P G ⁸ ..	N	0.50	—	¹⁰ No charge for relaying messages
Sianfu ⁴	Shensi	—	—	Government	—	—	—	—	—	¹¹ Operated by the United States Marine Corps
Tientsin	—	WYX	—	U.S. Army	—	—	—	—	—	¹² In the case of messages originating at or intended for Shanghai or Woosung (Kiangsu), the local land line charge is included in the coast tax
Tsungming	31° 30' 00" N. 121° 20' 00" E.	XSU	—	—	—	—	—	—	—	¹³ The station transmits a time signal (see International Time and Weather Signals—China)
Urga(see Lan-Chau-Fu)										¹⁴ Seventh time belt east of the Greenwich belt
Urumchi ⁴	Sinking	—	—	Government	600, 1,200, 1,600, 2,100	—	—	—	—	
Woosung, Kiangsu	31° 21' 00" N. 121° 25' 00" E.	XSG	650	Government	600, 1,200, 1,600, 2,100	P G ¹ ..	N	0.50 ⁵	—	
Wuchang	30° 30' 00" N. 114° 23' 00" E.	XOC	650	Government	600, 1,200, 1,600, 2,100, 3,000	O ..	0800 to 2200 ³	—	—	

Under construction

The station also communicates by radiotelegraphy with Malunga.
 Messages giving warning of cyclones are transmitted by this station.
 (See International Time and Weather Signals.)

With the wavelength of 600 metres.
 With the wavelength of 1,700 metres.
 Mean time of New Zealand, 11 hours 30 minutes in advance of Greenwich

COCHIN CHINA
(See FRENCH-INDO CHINA).

COCOS KEELING ISLANDS

Cocos

Indian Ocean
12° 05' 24" S.
96° 55' 20" E.

VPK

150

Eastern Extension
Australasia and
China Telegraph
Co.

300, 600

P G ..

N

0.60

COLOMBIA

Baranquilla¹ ..Bogotá¹ ..Call¹ ..

Cartagena, Colombia

Cucuta¹ ..Medellín¹ ..Puerto Colombia¹ ..

Santa Marta ..

San Andreas¹ ..

Caribbean Sea

10° 56' 00" N.
74° 46' 00" W.
4° 35' 00" N.
74° 12' 00" W.
3° 25' 00" N.
76° 45' 00" W.
10° 40' 00" N.
75° 30' 00" W.
7° 28' 00" N.
72° 42' 00" W.
6° 02' 00" N.
75° 50' 00" W.
11° 02' 00" N.
75° 00' 00" W.

CTG

600

Ges. für Drahtlose
Tel.800, 1,500,
2,000, 2,500,
3,000

P G ..

0600 to 2400

0.50

0.50

0.60

0.60

COMORO ISLANDS

Dzaoudzi ..

Mutsamudu ..

Mayotta Island

12° 46' 55" S.
44° 16' 59" E.
Johana
12° 09' 26" S.
44° 24' 27" E.

FDO

430

French Govern-
ment

300, 600

P G¹ ..0700 to 1100
1330 to 1700
1900 to 2100
0700 to 1100
1330 to 1700

0.50

0.50

0.50

0.50

0.50

0.50

0.50

0.50

0.50

0.50

0.50

0.50

COOK (or Harvey)
ISLANDS

Rarotonga ..

21° 12' 00" S.
159° 48' 30" W.

VMR

Day 500¹
Night
850¹

Government ..

300, 600, 1,700

P G ..

1800 to 0200¹

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

0.60

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word	Minimum Charge.	
COSTA RICA										
Limon ..	—	X	—	United Fruit Co.	—	PG ..	—	Francs. 0.60	Francs. —	
CUBA										
Baracoa ..	Province of Santiago de Cuba 20° 21' 46" N. 74° 29' 13" W.	PWE	300	Government ..	300, 750	PG ..	—	—	—	
Camaguey ¹ ..	—	C	—	Government ..	—	PG ..	—	0.40	—	
Cayo Cristo ..	—	CO	—	Government ..	—	PG ..	—	0.40	—	
Chaparra ..	Province of Santiago de Cuba 21° 12' 30" N. 76° 27' 40" W.	PWD	300	Government ..	300, 750	PG ..	—	—	—	
Guantanamo Bay ²	South Coast of Cuba 19° 54' 54" N. 75° 09' 27" W.	NAW	250	U.S. Navy ..	300, 600	PG ..	N	0.30	—	¹ The working of the station is temporarily suspended ² Operated by the United States Navy
La Fé ..	Province of Pinar del Rio 22° 02' 00" N. 82° 18' 00" W.	PWG	500	—	300, 3,800	PG ..	—	—	—	
Maniti ..	—	NMB	—	U.S. Navy ..	300, 600	PG ..	N	0.30	—	
Morro ..	Havana 23° 09' 26" N. 82° 21' 29" W.	PWA	1,000	Government ..	700, 2,800	PG ..	—	—	—	
Nueva Gerona ..	Isla de Pinos 21° 52' 30" N. 82° 42' 00" W.	PWF	500-600	Government ..	300, 750	PG ..	—	—	—	
Pinar del Rio ..	—	R	—	Government ..	—	PG ..	—	0.40	—	
Santa Clara ..	Province of S. Clara 22° 24' 00" N. 79° 59' 30" W.	PWC	300	Government ..	300, 750	PG ..	—	—	—	
Santiago de Cuba ..	—	SN	—	Government ..	—	PG ..	—	0.40	—	

CURAÇAO		PJA	108	Government	..	600	— ¹	Local time, 0900 to 1100 1400 to 1600 Sundays and holidays 1145 to 1245 0900 to 1100 1400 to 1600 Sundays and holidays 1145 to 1245 0500 to 0700 and 2400 Sundays and Holidays 0500 to 0600 and 1200	0.60	—	¹ The station exchanges public correspondence with Curaçao ² The station also ex- changes correspondence with Aruba and Bonaire
Aruba	..	Dutch West Indies 12° 31' 03" N. 70° 02' 01" W.	108	Government	..	600	— ¹		0.60	—	
Bonaire, Ile ..	..	Dutch West Indies 12° 09' 20" N. 68° 16' 15" W.	108	Government	..	600	— ¹		0.60	—	
Curaçao	..	Dutch West Indies 12° 06' 20" N. 68° 56' 35" W.	400	Government	..	300, 600, 1,800	P G ² ..		0.60	—	
CYPRUS											
Famagusta ..	..	35° 08' 00" N. 33° 59' 00" E.	—	—	—	—	O ..	—	—	—	
CYRENAICA											
Bongasi Radio	..	32° 06' 14" N. 20° 03' 15" E.	160	—	—	300, 600	P G ..	N	0.30	—	
Derna Radio	..	32° 44' 54" N. 22° 39' 46" E.	270	—	—	300, 600	P G ..	N	0.30	—	
Tobruch Radio	..	32° 03' 30" N. 24° 00' 00" E.	270	—	—	300, 600	P G ..	N	—	—	
DENMARK											
Anholt-Knob *	..	56° 45' 58" N. 11° 51' 51" E.	100	—	—	300, 600	— ³	Central European Time. ¹ X	—	—	¹ One hour in advance of Greenwich time ² Lights. The posi- tion shown is that of the anchor ³ Communicates with ships in case of distress only ⁴ Official correspond- ence with the Danish ferry boats of the Gjedser- Warrenhede line, con- cerning railway traffic
Blaavand Radio	..	North Sea Coast 55° 33' 28" N. 8° 05' 11" E.	200	Government	..	300, 600	P G ..	N	0.30	3.00	
Copenhagen Radio ..	..	55° 40' 40" N. 12° 36' 32" E.	200	Government	..	300, 600	P G ..	N	0.30	3.00	
Drogden ** ..	..	The Sound 55° 33' 03" N. 12° 42' 57" E.	15	Government	..	300, 600	— ⁴	N	—	—	
Gilleleje-Flak N *	..	56° 09' 48" N. 12° 18' 00" E.	—	Government	..	—	P R ..	—	—	—	
Gjedser Havn **	..	Falster Island 54° 34' 25" N. 11° 55' 48" E.	135	State Railways of Denmark	..	300, 450, 600, 800, 1,000	O ⁴ ..	0600 to 2000	—	—	
Gjedser Havn **	..	54° 32' 24" N. 11° 56' 20" E.	25	State Railways of Denmark	..	250	—	In general, N	—	—	
Gjedser Rev. *	..	Baltic Sea 54° 27' 12" N. 12° 11' 00" E.	5	Government	..	300	P R ..	—	—	—	

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
DENMARK—contd.	Meridian of Greenwich.							Frances.	Frances.	
Graadby ¹ ..	North Sea 5° 20' 02" N. 8° 04' 41" E.	OUX	30	Government ..	200	—	N	—	—	
Horns Rev ¹ ..	North Sea 55° 34' 06" N. 7° 19' 30" E.	OUZ	30	Government ..	200	—	N	—	—	
Laeso-Rende ¹ ..	55° 12' 48" N. 10° 41' 38" E.	—	—	Government ..	—	—	P R	—	—	
Laeso-Trindel ¹ ..	55° 26' 30" N. 11° 16' 45" E.	—	—	Government ..	—	—	P R	—	—	
Lappegrunden ..	The Sound 56° 04' 05" N. 12° 37' 08" E.	OOU	30	—	300, 600	— ¹	X	—	—	
Schultz-Grund ¹ ..	56° 08' 24" N. 11° 11' 10" E.	—	—	Government ..	—	—	P R	—	—	
Skagens Rev. ¹ ..	North Sea 57° 46' 00" N. 10° 43' 20" E.	—	—	Government ..	—	—	P R	—	—	
Vyl ¹ ..	North Sea 52° 23' 38" N. 7° 44' 13" E.	OUY	30	Government ..	200	—	N	—	—	
DODECANESE										
Rodi ..	—	ICW	—	Italian Army ..	—	—	X	—	—	
Stampalia ..	—	IDA	—	Italian Army ..	—	—	—	—	—	
DUTCH EAST INDIES										
Ambolna Radio ..	Ambolna Island 3° 46' 40" S. 128° 06' 00" E.	PKE	420	Government ..	600, 1,600 2,300	P G ..	Java Mean Time. ¹ Weekdays: 0700 to 0800 1330 to 1900 Sundays: 1330 to 1900 0910 1430 to 1530 1600 to 1630	0.60	6.00	¹ Mean time of the Island of Java, 109° 48' 37.05" E. of Greenwich.
Balikpapan Radio ..	Borneo 1° 16' 10" S. 116° 51' 00" E.	PKF	150	Batavia Petroleum Co. ..	600, 3,375	P R ¹ ..	—	0.40	4.00	¹ The station communicates only with the steamers of the following companies: Java-China-Japan Line; Java-Pacific Line; Anglo-Saxon Petroleum Co.; Koninklijke Steam Packet Co., Rotterdam Lloyd, Netherlands
Dilli ¹ ..	Timor 8° 33' 00" S. 125° 35' 00" E.	—	—	—	600, 1,200, 1,600, 2,400	—	—	—	—	

DUTCH EAST INDIES —contd.	Meridian of Greenwich.	PKD	420	Government	800, 1,600, 2,300	P G	Weekdays: 0700 to 0800 1330 to 1900 Sundays: 1330 to 1900	0.60	6.00	Steamship Co., Dutch Indies Tank Steamer Co., La Coruña Petroleum Co., Zeelandia Sealigner Co., Batavia Petroleum Co. * Under construction
Koepang Radio	10° 00' 30" S. 123° 36' 50" E.	—	—	—	—	—	—	—	—	—
Manggarai	6° 12' 10" S. 106° 51' 35" E.	PKA	400	Government	600	P G	N	0.60	6.00	—
Sabang Radio	Sumatra, Weh Island	—	—	—	—	—	—	—	—	—
Sitebondo Radio	5° 54' 00" N. 95° 20' 06" E. Java 7° 41' 00" S. 114° 05' 30" E.	PKC	420	Government	800, 1,600, 2,300	P G	Weekdays: 0700 to 0800 1330 to 1900 Sundays: 1330 to 1900	0.60	6.00	—
Socrabaya	Java 2° 12' 05" S. 112° 44' 30" E.	PKH	—	Government Marine Dept.	—	O	—	—	—	—
Tarakan	Island of Tarakan 3° 18' 14" N. 117° 36' 12" E.	PKG	150	Batavia Petro- leum Co.	800, 2,955	P R	0910 1430 to 1530 1600 to 1630 0600 to 2300 Sundays and holidays: 0900 to 1200 1500 to 1700	0.40	4.00	Under construction Inland service of Ecuador only
Wetvredden Radio	Near Batavia 6° 09' 40" S. 106° 50' 20" E.	PKB	270	Government Ma- rine Dept.	600	P G, O	—	0.60	6.00	—
EMUADOR										
Esmeraldas	0° 58' 00" N. 79° 42' 00" W.	HCE	500	Government	1,700 (spark)	P G	0600 to 1000 1300 to 1600 1800 to 2200	0.60	6.00	—
Guayaquil	—	GPH	—	Captain of the port	—	P	—	—	—	—
Guayaquil	2° 12' 00" S. 79° 50' 00" W.	HCG	900	Government	1,800 (spark)	P G	N	0.60	6.00	—
Quito	0° 15' 00" S. 78° 32' 00" W.	—	900	Government	1,800 (spark)	— ³	N	—	—	—
Santa Elena Point ¹	—	—	—	—	—	—	—	—	—	—
EGYPT							Eastern European Time ¹			
Abu Zabal, Cairo	Near Cairo 30° 02' 00" N. 31° 16' 00" E.	SUC	—	Post Office	4,500, 5,400 (spark) 5,800, 7,400(cw)	—	—	—	—	—
Alexandria Alexandria (Tin) ²	31° 11' 54" N. 29° 51' 46" E.	SUH	450	Egyptian Govern- ment	—	P G	N	—	—	—
Port Said	31° 15' 20" N. 32° 18' 10" E.	SUB	400	Egyptian Govern- ment	300, 800	P G ³	N	0.60	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ERITREA										
Asmara ..	Meridian of Greenwich. 15° 20' 00" N. 38° 30' 00" E.	ICW	—	Italian Govern- ment	—	—	—	—	—	¹ Communicates only with fixed stations ² Open for public correspondence direct with Rome ³ Communicates also with Mogadiscio ISG
Assab Radio ..	12° 59' 40" N. 42° 44' 00" E.	ICY	160	Italian Govern- ment	300, 600, 2,300, 3,900	P G ..	2400 to 0200 1200 to 1400 1600 to 1800 2000 to 2200	—	—	
Massaua IRG ..	Red Sea 15° 36' 30" N. 39° 28' 59" E.	IRG	50	Italian Govern- ment	300, 600	P G ..	2400 to 0200 1200 to 1400 1600 to 1800 2000 to 2200	—	—	
Massaua ICX ..	Red Sea 15° 36' 30" N. 39° 28' 52" E.	ICX	1600	Italian Govern- ment	4000	P G ² ..	X	—	—	
Thio ¹ ..	Red Sea 14° 41' 45" N. 40° 57' 35" E.	IRT	160	Italian Govern- ment	600	—	—	—	—	
ESTHONIA										
Hapsal ..	Esthonia 59° 00' 00" N. 23° 48' 00" E.	REC	—	—	—	O ..	—	—	—	
FALKLAND ISLANDS										
Falkland Islands ..	51° 41' 00" S. 57° 55' 00" W.	BZN	—	British Admiralty	—	P G ..	Local Time. ¹ —	0.60	—	¹ Local time, 3 hours 55 minutes later than Greenwich time
Fort Stanley ..	51° 41' 15" S. 57° 49' 15" W.	VPC	650	Colonial Govern- ment	300, 600	P G ..	0900 to 1200 2100 to 2400	0.60 ²	—	² In the case of messages originating at or intended for Falkland Islands the local land line charge is included in the coast tax
Fox Bay ..	51° 59' 00" S. 60° 02' 00" W.	VQZ	80-100	Colonial Govern- ment	600	— ³	—	—	—	³ Communicates only with fixed stations
ANNING ISLAND.										
Anning Island ..	3° 51' 00" N. 159° 21' 00" W.	VQN	150	F. R. Pelly ..	300, 600	P R ¹ ..	—	0.60	—	¹ The station also exchanges official and public correspondence with Washington Island

FARÖE ISLANDS	Thorshavn ..	Island of Stromo 62° 00' 52" N. 6° 46' 06" W.	OXJ	100	Great Northern Telegraph Co.	300, 500, 800	P G ¹ ..	— ²	0.15	—	³ The station also com- municates with Tvaeraa ² The station only com- municates with Thors- havn ³ The station is open weekdays: 0800 to 2100 (2130 from June 1 to Aug. 31). Sundays and holidays: 1100 to 1300 and 1700 to 2000 However, with the ex- ception of the first ten minutes of each of these hours it communicates with ships only if not occu- pied in communication with Tvaeraa
	Tvaeraa ..	Island of Sudero 61° 33' 12" N. 6° 48' 00" E.	OKK	—	—	300, 500, 800	— ³	—	—	—	
FERNANDO PO	Santa Isabel de Fer- nando Po	3° 46' 00" N. 8° 48' 40" E.	EAV	130	Government	300, 800, 1,800	P G ..	Local Time. 0600 to 0900 1900 to 2200	0.55 ¹	5.50 ¹	¹ In the case of mes- sages destined to the is- land of Fernando P ^o , the charge for delivery to destination is included in the coast charge; and, moreover, the minimum charge is not applicable to these messages destined to the island
FJI ISLANDS	Labasa ..	16° 26' 05" S. 179° 24' 33" E.	VPE	300	Government	300, 600	P G ¹ ..	Fiji Islands Time. ¹ — ²	0.60	—	³ Twelve hours in ad- vance of Greenwich time ² The station exchanges meteorological telegrams with ships in stormy weather ³ From Monday to Friday, 0900 to 1300, 1400 to 1500, or until completion of work, and at 1900 until completion of work; Saturday, as above, but first watch only. Sundays and holi- days, 0800 to 0830, and at 1900 till completion of work
	Savu Savu ..	Vanua Levu 16° 46' 30" S. 179° 21' 30" E.	VQL	120	Government	800	— ⁴	—	—	—	⁴ The station only works with fixed stations
	Suva ..	Viti Levu 18° 08' 43" S. 178° 27' 33" E.	VPD	300	Government	300, 800	P G ¹ ..	— ³	0.60	—	
	Laveuni ..	16° 47' 46" S. 180° 00' 16" E.	VPF	200	Government	300, 800	P G ² ..	— ³	0.60	—	
FINLAND	Helsingfors ..	60° 27' 00" N. 24° 57' 00" E.	REB	—	—	60	O ..	—	—	—	¹ Under construction
	Sandhamn ¹ ..	Near Helsingfors	—	—	—	—	—	—	—	—	

Land Stations--Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
FRANCE								Francs.	Francs.	
Ajaccio-Aspretto ..	Corse 41° 55' 31" N. 8° 55' 36" E.	FUI	—	Navy ..	—	O ..	N	—	—	¹ The coast charge is reduced to fr. 0.15 per word for ships whose regular service is between France on the one hand and Corsica, Algeria, and Tunis on the other.
Barre de L'Adour ..	Near Bayonne 43° 31' 40" N. 1° 31' 40" W.	FUW	150	Navy ..	300, 600	P R ¹¹ ..	N	0.40	—	² Direction finding station.
Barre de L'Adour-Gonio ³ ..	43° 31' 40" N. 1° 31' 40" W.	FEU	—	Navy ..	450	D F ..	—	—	—	³ The coast charge is reduced to fr. 0.15 per word for correspondence with ships whose home ports are on the coast of the English Channel and the Straits of Dover, and which are engaged in a regular service between France and England.
Bernières-Gonio ³ ..	49° 20' 00" N. 0° 25' 00" W.	FEB	—	Navy ..	450	D F ..	—	—	—	⁴ Direction finding station.
Bonifacio T.S.F. ..	Straits of Bonifacio 41° 23' 15" N. 9° 12' 00" E.	FFC	350	Postal, Telegraph and Telephone Administration	300, 600	P G ..	N	0.40 ¹	—	⁵ The coast charge is reduced to fr. 0.15 per word for correspondence with ships whose home ports are on the coast of the English Channel and the Straits of Dover, and which are engaged in a regular service between France and England.
Bordeaux T.S.F. ..	44° 52' 21" N. 0° 37' 12" W.	FFX	250	Postal, Telegraph, and Telephone Administration	300, 600	P G ..	N	0.40	—	⁶ Direction finding station, all transmission is made by Mergam FUE.
Boulogne-sur-Mer T.S.F. ..	50° 43' 00" N. 1° 37' 00" E.	FFB	250	Postal, Telegraph, and Telephone Administration	300, 600	P G ..	N	0.40 ³	—	⁷ This station is also open for direction finding service.
Brest-Guipavas ² ..	48° 27' 00" N. 4° 26' 30" W.	FHA	—	Navy ..	450, 600	D F ..	—	—	—	⁸ Direction finding station, all transmission is made by Ouessant T.S.F.
Calais ..	50° 58' 30" N. 1° 31' 00" E.	FUL	—	Navy ..	—	O ..	—	—	—	⁹ Special correspondence in connection with the marine business of the ships employed on the service between Dieppe and Newhaven.
Capucius-Gonio ² ..	48° 19' 15" N. 4° 34' 48" W.	FEC	—	Navy ..	450	D F ⁴ ..	—	—	—	¹⁰ Transmits daily a time signal and meteorological message. (See International Time and Weather Signals)
Chemoulin ..	47° 04' 00" N. 2° 18' 00" W.	FUH	—	Navy ..	450, 600	—	—	—	—	
Cherbourg ..	49° 36' 32" N. 1° 36' 00" W.	FFC	—	Navy ..	450, 600	—	—	—	—	
Cherbourg-Rouges-Terres ² ..	49° 36' 32" N. 1° 36' 00" W.	FUC	—	Navy ..	—	P G, D F	0700 to 2200	—	—	
Croix d'Hins ¹⁰ ..	Near Bordeaux 49° 55' 30" N. 1° 04' 30" E.	FFI	150	State Administration	400	P ⁷ ..	1000 to 1400 2030 to 2330 N	—	—	
Dieppe ..	51° 00' 30" N. 2° 23' 15" E.	FUD	—	Navy ..	—	O ..	—	—	—	
Dunkerque Castelneau	50° 52' 18" N. 1° 35' 18" E.	FL	—	Army ..	2,500	— ⁸	—	—	—	
Eiffel Tower, Paris ..	48° 51' 30" N. 2° 28' 00" E.	FNZ	—	Navy ..	450, 600	—	—	—	—	
Gris-Nez ¹⁰ ..	50° 52' 18" N. 1° 35' 18" E.	FNZ	—	Navy ..	450, 600	—	—	—	—	

Station	Lat.	Long.	FEG	Navy	Postal, Telegraph, and Telephone Administration	450	P G, D F	N	0.40 ¹	Transmits daily a time signal. (See International Time and Weather Signals) ¹⁰ Under construction with ships entering or leaving the port of Bayonne ¹¹ Works in connection with Marseilles T.S.F. ¹² Works in connection with Ouessant T.S.F. ¹³ Works with Toulon Croix des Signaux ¹⁴ Continuous wave and telephony station
Guipavas-Gonio	48° 27' 00" N.	4° 26' 00" W.	FEG	Navy	Postal, Telegraph, and Telephone Administration	450	—	N	—	
Havre T.S.F. (Le) *	49° 31' 30" N.	0° 07' 00" E.	FFH	250	—	450, 800	P G, D F	N	0.40 ¹	
Lorient-Pen-Mané *	47° 44' 00" N.	3° 21' 00" W.	FUN	—	—	450	O, D F	N	—	
Lyons	45° 41' 00" N.	4° 47' 00" E.	YN	—	—	15,000 (cw.)	—	—	—	
Marseilles-Gonio ¹¹	43° 17' 58" N.	5° 21' 16" E.	FFM	Navy	—	450	—	N	—	
Marseilles T.S.F.	43° 19' 00" N.	5° 21' 00" E.	FFM	250	Postal, Telegraph, and Telephone Administration	600	P G	N	0.40 ¹	
Mengam	48° 22' 00" N.	4° 34' 00" W.	PUE	Navy	—	—	O	0700 to 2200	—	
Nantes	—	—	UA	—	—	11,000	—	—	—	
Nice T.S.F.	43° 30' 00" N.	7° 10' 00" E.	FFN	250	Postal, Telegraph, and Telephone Administration	300, 800	P G	N	0.40 ¹	
Ouessant-Gonio ¹²	48° 26' 27" N.	5° 05' 33" W.	FFU	Navy	—	450	D F	N	—	
Ouessant T.S.F.	48° 27' 05" N.	5° 05' 00" W.	FFU	400	Postal, Telegraph, and Telephone Administration	300, 800	P G	N	0.40	
Ouessant Pen ar Roch *	48° 26' 27" N.	5° 05' 33" W.	FHY	Navy	—	450, 800	D F *	—	—	
Paris ¹³	—	—	ZA	Army	—	1,400	—	0745, 0800, 1150	—	
Pointe du Raz-Gonio *	48° 02' 22" N.	4° 43' 52" W.	FER	Navy	—	450	D F	N	—	
Porquerolles	Hyeres Islands	42° 59' 00" N.	FUQ	Navy	—	—	O	N	—	
Rochefort-sur-Mer	46° 12' 00" E.	6° 12' 00" E.	FUR	Navy	—	—	O	N	—	
Soubise-Gonio *	45° 55' 30" N.	4° 55' 30" W.	FES	Navy	—	450	D F	N	—	
S. Marie de a Mer T.S.F.	45° 36' 00" N.	5° 38' 40" W.	FFS	450	Postal, Telegraph, and Telephone Administration	300, 800	P G	N	0.40 ¹	
S. Nazaire-Chemoulin-Gonio	47° 11' 00" N.	2° 18' 00" W.	FEZ	Navy	—	450	D F	N	—	
Toulon Croix des Signaux	43° 04' 45" N.	5° 56' 05" E.	FUX	Navy	—	—	O	N	—	
Toulon-Gonio ¹⁴	43° 06' 35" N.	5° 54' 38" E.	FUX	Navy	—	450	D F	N	—	
Toulon-Mourillon	43° 07' 00" N.	5° 55' 00" E.	FUT	Navy	—	450	O	N	—	
Trégüier St. Gonery-Gonio *	48° 50' 08" N.	3° 15' 56" W.	FET	Navy	—	450, 800	D F	N	—	

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
FRENCH EQUATORIAL AFRICA										
Bangui ¹	—	—	—	—	—	—	Local Time. ¹	—	—	¹ One hour in advance of Greenwich time ² Continuous service during the voyages of the regular steamers ³ Under construction
Brazzaville ²	4° 28' 00" S. 15° 13' 00" E.	—	—	—	—	—	—	—	—	
Duala	4° 02' 41" N. 9° 40' 50" E.	FKF	—	—	—	O	—	—	—	
Loango	Congo, Pointe Noire 4° 46' 49" S. 11° 43' 02" E.	FGO	Day 275 Night 550	Government	300, 600, 1,800	P G	0800 to 1030 ² 1400 to 1630 ³	—	—	
FRENCH GUIANA										
Cayenne ¹	5° 56' 20" N. 52° 22' 46" W.	FKY	250	Government	—	—	—	—	—	¹ Under construction
FRENCH INDO-CHINA										
Baolac ¹	—	—	—	—	—	—	—	—	—	¹ Under construction ² Meteorological telegrams are transmitted at 0930 ³ Seventh time belt east of the Greenwich belt
Caobang ¹	22° 53' 00" N. 104° 57' 00" E.	—	—	—	—	—	—	—	—	
Ha-Chiang ¹	21° 03' 49" N. 105° 54' 18" E.	—	—	—	—	—	—	—	—	
Hanoi	Near Haiphong 20° 48' 34" N. 106° 41' 50" E.	FAO	1,000	Government	300, 600, 1,800, 2,400, 3,000	P G ² , O	0700 to 1100 1400 to 1700	0.25	2.00	
Kien-An	21° 48' 00" N. 106° 40' 00" E.	FKA	503	Government	300, 600, 1,800	P G, O.	0700 to 1100 1400 to 1700	0.25	2.00	
Langson ¹	22° 35' 00" N. 104° 00' 00" E.	—	—	—	—	—	—	—	—	
Lao-Kai ¹	19° 50' 00" N. 103° 07' 00" E.	—	—	—	—	—	—	—	—	
Luang-Prabang ¹	21° 25' 00" N. 107° 53' 00" E.	—	—	—	—	—	—	—	—	
Montcay ¹	9° 19' 00" N. 106° 37' 14" E.	—	—	—	—	—	—	—	—	
Poulo-Condore	—	FPR	200	Government	—	—	—	—	—	

¹ One hour in advance of Greenwich time
² Continuous service during the voyages of the regular steamers
³ Under construction

¹ Under construction

¹ Under construction
² Meteorological telegrams are transmitted at 0930
³ Seventh time belt east of the Greenwich belt

Station	Lat. Long.	FCA	FLT	Government	Power	P. G. U. P. G. O.	0700 to 1400 1400 to 1700 0700 to 1100 ^a 1400 to 1700	Wave	Remarks
Saigon	16° 46' 47" N. 104° 21' 29" E.	200		Government	300, 800	P. G. U.	0700 to 1400 1400 to 1700	2.00	
Tourane	Tourane Bay, Observatory Islet 16° 06' 55" N. 108° 12' 04" E.	250	FLT	Government	300, 800, 1,800	P. G. O.	0700 to 1400 1400 to 1700	0.25	
Vientiane	Laos	—	—	—	—	—	—	—	
FRENCH CAMBODIA									
Nouméa-Sémaphore, New Caledonia	22° 16' 14" S. 168° 27' 07" E.	400	FQN	Government	300, 600	P. G.	Local Time, 1000 to 1100 1400 to 1500 1700 to 1800 2000 to 2400	0.40 ^b	¹ The charge is reduced to 20 centimes for correspondence with ships engaged on a regular service on the coast of New Caledonia and Dependencies ² With 600 m. wave ³ With 2,000 m. wave ⁴ The wavelengths of 2,000 and 2,500 m. are used for messages exchanged with Apia (Samoa Is.) every day from 1930 until completion of traffic ⁵ Meteorological reports and navigation notices are transmitted twice daily at 1100 and 2300. (See International Time and Weather Signals) ⁶ Connected to the International Telegraph System by wireless through Apia (Samoa Is.) and Awanui Radio, New Zealand ⁷ The station also communicates with Tutuila, using 600 m. wave ⁸ Meridian 150° west of Greenwich ⁹ The station also listens from 0900 to 0915, 1000 to 1015, 1100 to 1115, 1500 to 1515, 1600 to 1615, 1700 to 1715 ¹⁰ The hours are extended during the passage of the regular steamers or in case of necessity
Port Vila, New Hebrides	17° 44' 30" S. 168° 18' 30" E.	600	HNV	Government	—	P. G.	—	—	
Wahina	17° 29' 30" S. 149° 29' 15" W.	600 ^a Night 1,500 ^a	FOP	Government	800, 2,000, 2,500 ^a	P. G. ^{1,2,3}	Local Time: 2400 to 0200 0400 to 0500 1930 to 2400 ^a Sundays and holidays: 2400 to 0300 0800 to 0900 1930 to 2400 ^a	0.60	
Tahiti									
FRENCH SOMALI-LAND									
Djibouti	11° 35' 32" N. 43° 09' 24" E.	350	FLT	Government	—	P. G.	—	0.30	

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
FRENCH WEST AFRICA	Meridian of Greenwich.							Francs.	Francs.	
Agades ¹	—	—	—	Government	—	PG ² ..	—	—	—	¹ Interior station
Atar ¹	Mauritania	—	—	—	—	—	—	—	—	² The station is open for public correspondence in the inland service
Bamako ¹	13° 40' 00" N. 7° 50' 00" W.	—	—	—	—	—	—	—	—	³ This station connects with the International Telegraph System through Port Etienne and Rufisque
Bilma ¹	—	—	—	Government	—	PG ² ..	—	—	—	⁴ The station connects with the inland telegraph system through the Rufisque station
Chinguetti ¹	Guinea	FCO	600	Government	600, 2,000	PG ..	Sunrise to sunset	0.30	—	⁵ The Rufisque station communicates with the interior. It only communicates with ships in the case of the interruption of the Dakar station. It then uses the 600-metre wavelength
Conakry	0° 30' 55" N. 13° 42' 46" W.	—	—	Government	—	PG ² ..	—	—	—	⁶ Under construction
Dakar	13° 42' 46" W.	FDA	700	Government	600	PG ² ..	N	0.30	—	
Port-Etienne	14° 40' 27" N. 19° 45' 36" W.	FPE	700	Government	600	PG ² ..	Sunrise to sunset	0.30	—	
Rufisque	Bay of Lévrier 26° 55' 39" N. 17° 03' 01" W.	FRU	700	Government	600, 2,000	PG ² ..	Sunrise to sunset	0.30	—	
Tabou	Senegal 14° 43' 04" N. 17° 16' 23" W.	FTA	600	Government	600	PG ..	Sunrise to sunset	0.30	—	
Timbuctu ¹	Ivory Coast 4° 25' 19" N. 7° 22' 22" W. 16° 38' 00" N. 2° 40' 00" W.	—	—	—	—	—	—	—	—	
FRIENDLY ISLANDS (See TONGA)										
GAMBIA (West Africa)										
Bathurst	13° 25' 00" N. 16° 50' 00" W.	BZK	1,000	British Admiralty	600 ¹ –2,000 (spark) 4,000 (arc)	P R ..	—	0.60	—	¹ Other wavelengths are used for official correspondence
GEORGIA										
Tiflis ..	—	TIF ¹	—	Georgian Government	—	—	—	—	—	¹ Unofficial call sign

GERMANY	Name of Station	KAF	Time	Government	Frequency	Power	Call	Notes
Amrumbank	Light-ship	KAF	210	Government	300, 450, 600	PR 12	N	0.37-5 ²
Berlin	..	DM	—	—	1,900	—	—	—
Berlin (See Königs- Wusterhausen)	..	DK	—	—	2,100	—	—	—
Borkum Reef Lightship	..	KBR	60	Government	300, 600	PR 12	N	0.37-5 ²
Bülk	..	KBK	110	Government	300	PG 3 ²	N	0.37-5 ²
Casel...	..	XU	—	—	1,200	—	—	—
Constance	..	KN	—	—	1,450	—	—	—
Cuxhaven	..	KBX	Day 325 Night 650	Government	300, 600	PG 3 ²	N	0.37-5 ²
Darmstadt	..	DA	—	—	1,724	—	—	—
Dortmund	..	DR	—	—	1,100	—	—	—
Eider Lightship	..	KAJ	30	Government	800, 600	PR 12	N	0.37-5 ²
Eiderlotsengallote Lightship	..	KBL	21	Government	800, 600	PR 12	N	0.37-5 ²
Elbese	..	OUI	—	Government	15,000 (cw)	—	N	—
Elbe Lightship-Eis	..	KBF	60	Government	300	PR 12	N	0.37-5 ²
Fehmarnbet Light- ship	..	KBC	Day 105 Night 210	—	300, 450, 600	PR 12	N	0.37-5 ²
Frankfort-on-Main	..	FM	—	—	1,675	—	—	—
Frankfort-on-Main	..	WH	—	—	1,200	—	—	—
Frankfort-on-Order	..	F 4	—	—	1,200	—	—	—
Friedrichshafen	..	FD	—	—	—	—	—	—
Hamburg	..	HG	—	—	2,100	—	—	—
Hanover	..	HW	—	—	2,300	—	—	—
Hanover	..	SF	—	—	1,200	—	—	—
Königsberg	..	KO	—	—	2,500	—	—	—
Königs Wusterhausen (Berlin)	..	LP	—	Government	5,500	—	—	—
Leipzig	..	LZ	—	—	1,100	—	—	—
Magdeburg	..	MA	—	—	1,200	—	—	—
Munich	..	CW	—	—	1,200	—	—	—
Münster Ruhr	..	W 1	—	—	—	—	—	—
Nauen	..	POZ	—	Government	5,500 (spk) 12,600 (cw)	— ⁸	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
GERMANY—contd.										
Neuenmünster ..	Meridian of Greenwich.	OK	—	—	1,200	—	—	—	—	¹⁰ The station is prepared to receive calls chiefly during the first fifteen minutes of the second half of each of its hours of service. ¹¹ Public correspondence for urgent navigation messages only. ¹² Special maritime notices are transmitted three times when they first come to hand and so long as the necessity exists are repeated three times at noon and midnight daily. ¹³ The station accepts public correspondence when there is no naval correspondence.
Norddeitch ..	North Sea Coast 53° 36' 26" N. 7° 08' 32" E.	KAV	Day 420 Night 830	Government ..	300, 600, 1,800	P G ¹¹ ..	N	0.37.5	3.75	
Nuremberg ..	—	X 1	—	—	1,200	—	—	—	—	
Pilten ..	Baltic Sea 54° 38' 42" N. 19° 53' 27" E.	KAP	Day 300 Night 600	—	600	P R ¹² ..	—	—	—	
Sassnitz ..	Island of Rügen 54° 30' 52" N. 13° 39' 14" E.	KBV	110	Prussian Railway Administration	375	P R ¹² ..	N	0.37.5	3.75	
Saaken ..	—	SK	—	—	—	—	—	—	—	
Stettin ..	—	SN	—	—	1,800	—	—	—	—	
Stettin ..	—	GM	—	—	1,200	—	—	—	—	
Stuttgart ..	—	SG	—	—	1,200	—	—	—	—	
Swinemünde ..	Usedom Island 53° 54' 55" N. 14° 16' 15" E.	KAW	330	Government ..	300, 600, 1,800	P G ¹¹ ..	0600 to 2400 ¹³	0.37.5	3.75	
Weser Lightship	North Sea 53° 54' 18" N. 7° 49' 03" E.	KBW	80	Government ..	300	P R ¹² ..	N	0.37.5 ⁸	3.75 ⁸	
GIBRALTAR										
North Front ..	36° 08' 37" N. 5° 20' 27" W.	BWW	—	British Admiralty	2,700 (spk) 4,000 (cw)	O ..	—	—	—	
Rock (Gibraltar) ..	36° 06' 21" N. 5° 20' 53" W.	BYW	500	British Admiralty	600 (spk) 2,800 (cw)	O, P G ¹¹ ..	N	0.60	—	
Gibraltar (Windmill Hill)	36° 06' 51" N. 5° 20' 43" W.	BYX	—	British Admiralty	—	O ..	—	—	—	

	VQK	400 ^a 600 ^b	Government of Colony	600, 1,800	P G ^{c,d} ..	N	0.60	—	The station is con- nected with the Inter- national Telegraph Sys- tem by wireless through Nauru, Woodlark Island, and Townsville Radio. ^a The station also ex- changes official and public correspondence with Nauru, Fuliagi, and Apia. ^b With the wavelength of 600 metres ^c With the wavelength of 1,800 metres
GILBERT AND ELIJAH ISLANDS	Ocean Island	..	..	..	..	..	..	..	..
	0° 30' 00" S. 169° 20' 00" E.	..	..	..	..	..	..	..	..
GOLD COAST COLONY	VPG	250	Government	300, 600	P G ..	0800 to 1600 Except Sundays	0.40	—	..
Accra..	5° 32' 30" N. 0° 12' 00" W.	..	..	..	..	..	..	..	..
GREAT BRITAIN (See UNITED KING- DOM)									
GREECE	SXA	—	Government	—	O ..	Eastern European Time	—	—	Under construction
Athens ..	37° 48' 30" N. 23° 43' 13" E.	150	—	—	P G ..	0600 to 2000	0.40	4.00	..
Athens, No. 2	—	—	Government	—	O ..	—	—	—	..
Corfu ..	39° 37' 11" N. 19° 54' 21" E.	—	French Navy	—	—	—	—	—	..
Corfou Potamo	39° 37' 00" N. 19° 53' 00" E.	—	—	—	O ..	—	—	—	..
Fassa ..	Andros Is. 37° 57' 33" N. 24° 24' 36" E.	—	—	—	—	—	—	—	..
Preveza ¹ ..	38° 46' 00" N. 26° 40' 00" E.	—	—	300, 600, 1,200, 2,400	—	—	—	—	..
Salamis ..	Island of Salamis 37° 36' 11" N. 23° 32' 02" E.	—	Government	—	O ..	—	—	—	..
Salonique ..	40° 35' 43" N. 22° 57' 56" E.	—	Government	—	O ..	—	—	—	..
Sydra ..	Island of Syra 37° 25' 43" N. 24° 36' 33" E.	—	Government	—	O ..	—	—	—	..
Thassos ..	Island of Thassos 40° 46' 00" N. 24° 43' 30" E.	—	Government	—	O ..	—	—	—	..

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
GUADELOUPE										
Destrellan ¹ ..	Meridian of Greenwich. 16° 15' 11" N. 61° 34' 23" W.	FKD	600	Government ..	800, 1,500	P G ..	0700 to 1800	Franks. 0.30 ² 0.15 ³	Franks. 3.00 ² 1.50 ³	¹ The station communicates with Port de France and Trinidad ² For ordinary radio-telegrams ³ For official radio-telegrams
GUAM (See MARIANNE ISLANDS)										
GUATEMALA										
Guatemala City ..	—	—	—	—	—	P	—	—	—	
Puerto Barrios ..	—	—	—	—	—	P	—	—	—	
HAWAIIAN ISLANDS										
Fort de Russy ..	Honolulu	WZG	300	U.S. Army ..	300, 800, 825	P G ..	0600 to 2200	—	—	¹ The station only communicates with fixed stations
Heeia Point ..	Island of Oahu 21° 26' 00" N. 157° 48' 20" W.	NPM	200	U.S. Navy ..	300, 800	P G ..	N	0.30	—	
Honolulu ..	—	WZH	—	U.S. Army Sigs... Radio Corporation of America	—	—	—	—	—	
Kahuku ..	Island of Oahu 21° 16' 00" N. 157° 42' 30" W.	KTE	2,200	—	9,000	P R ..	N	—	—	
Kaunakakai ..	Island of Molokai 21° 05' 21" N. 157° 01' 29" W.	KHO	30	Mutual Telephone Co., Ltd.	300, 450, 800	— ¹	N	—	—	
Kawithae ..	Island of Hawaii 20° 02' 38" N. 155° 50' 05" W.	KHN	300	Mutual Telephone Co., Ltd.	300, 575, 800	— ¹	N	—	—	
Koko Head NPM ..	Island of Oahu 21° 20' 05" N. 157° 01' 05" W.	NPM	500	U.S. Navy ..	300, 800	O ..	N	—	—	
Lahaina ..	Island of Maui 20° 52' 29" N. 156° 40' 50" W.	KHL	300	Mutual Telephone Co., Ltd.	300, 575, 800	— ¹	N	—	—	
Lihue ..	Island of Kauai 19° 22' 18" W. 155° 51' 54" N.	KHM	300	Mutual Telephone Co., Ltd.	300, 575, 800	— ¹	N	—	—	
Pearl Harbour ..	Island of Oahu 21° 17' 54" N. 157° 51' 43" W.	NPM	300	U.S. Navy ..	300, 800	P G ..	N	0.30	—	

Wahiaua	..	Island of Oahu 21° 29' 28" N. 158° 02' 37" W.	KHK	400	Mutual Telephone Co., Ltd.	300, 550, 600, 750	P G ¹	N	—	—
HAWAII (West Indies)										
Port-au-Prince ¹	..	18° 32' 50" N. 72° 15' 10" W.	NSC	250	U.S. Navy	300, 600	P G	N	0.30	¹ Operated by the United States Navy
HERMIT ISLANDS										
Maron	..	1° 33' 00" S. 145° 02' 00" E.	VHR	—	British Admiralty	—	—	—	—	—
HOLLAND (See NETHERLANDS)										
HONG-KONG										
Cape D'Agular	..	20° 12' 35" N. 114° 15' 35" E.	VPS	350	Post Office	300, 600, 1,800	P G	N	0.60 ¹	¹ This includes the inland charge
Stonecutters Island.	..	22° 19' 13" N. 114° 08' 30" E.	BXY	1,000	British Admiralty	600-2,000 (spark) 4,000, 4,200 (arc)	O	—	—	—
ICELAND										
Flatøy & Breidafirdi	..	65° 22' 30" N. 22° 55' 24" W.	TFB	250	Government	300, 600	P G	1100 to 1300 1700 to 1900 2100 to 2300	0.40	4.00
Reykjavik Radio	..	64° 08' 55" N. 21° 57' 11" W.	TFA	500	Government	300, 600, 1,800	P G	0900 to 1100 1500 to 1900 2100 to 0100	0.40	4.00
INDIA										
Allahabad ¹	..	25° 26' 00" N. 81° 55' 00" E.	VWA	—	Indian Government	—	—	—	—	¹ Interior station ² During the Daytime the station is largely occupied with inland communication
Bombay Radio	..	18° 55' 00" N. 72° 54' 00" E.	VWB	300	Indian Government	300, 600	P G ^{2,3}	N	0.35	³ Information regarding weather is distributed twice daily from the station at 1310 and 0050 (Indian standard time)
Calcutta Radio	..	22° 35' 00" N. 88° 25' 00" E.	VWC	300	Indian Government	300, 600	P G ^{2,4}	N	0.35	⁴ Information regarding weather is distributed twice daily at 1300 and 0040; also time signals are transmitted daily. (See International Time and Weather Signals)
Delhi	..	28° 44' 00" N. 77° 00' 00" E.	VWD	—	Indian Government	—	—	—	—	⁵ Time of British India 5 hours 30 min. in advance of Greenwich time
Diamond Island	..	Mouths of the Irrawadi 15° 51' 00" N. 94° 15' 00" E.	VTD	300	Indian Government	300, 600	P G ²	N	0.35	⁶ Information regarding weather distributed twice daily at 1300 and 0040; also time signals are transmitted daily. (See International Time and Weather Signals)
Karachi Radio	..	Mouths of the Indus 24° 30' 00" N. 67° 00' 00" E.	VWK	300	Indian Government	300, 600	P G ^{2,4}	N	0.35	⁷ Time of British India 5 hours 30 min. in advance of Greenwich time
Lahore ¹	..	31° 40' 00" N. 74° 25' 00" E.	VWL	—	Indian Government	—	—	—	—	⁸ Time of British India 5 hours 30 min. in advance of Greenwich time
Madras Radio	..	13° 05' 00" N. 80° 17' 16" E.	VWM	300	Indian Government	300, 600	P G ²	N	0.35	⁹ Time of British India 5 hours 30 min. in advance of Greenwich time

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
INDIA—contd.	Meridian of Greenwich.									
Maymyo ¹	20° 02' 00" N. 96° 29' 00" E.	VTM	—	Indian Government	—	—	—	—	—	—
Mhow ¹	22° 33' 00" N. 75° 45' 00" E.	VWH	—	Indian Government	—	—	—	—	—	—
Nagpur ¹	23° 17' 00" N. 75° 17' 00" E.	VWN	—	Indian Government	—	—	—	—	—	—
Peshawar ¹	34° 02' 00" N. 71° 40' 00" E.	VWP	—	Indian Government	—	—	—	—	—	—
Port Blair	South Andaman Islands 11° 41' 00" N. 92° 45' 00" E.	VTP	300	Indian Government	400, 600	P G ¹	N	0.35	—	—
Quetta ¹	30° 15' 00" N. 67° 00' 00" E.	VWQ	—	Indian Government	—	—	—	—	—	—
Rangoon Radio	Lower Burma 96° 07' 00" E. 16° 47' 00" N.	VTR	300	Indian Government	300, 600	P G ¹ ..	N	0.35	—	—
Sandheads	At the South of the Ganges Delta 21° 00' 00" N. 88° 09' 00" E.	VWS	200	Indian Government	300, 600	P G ¹ ..	0636 to 1836 ¹	0.35	—	—
Secunderabad ¹	17° 32' 00" N. 78° 33' 00" E.	VWX	—	Indian Government	—	—	—	—	—	—
Simla ¹	31° 06' 00" N. 77° 11' 00" E.	VWJ	—	Indian Government	—	—	—	—	—	—
Yable Island	14° 09' 00" N. 93° 23' 00" E.	VTT	—	Indian Government	—	—	—	—	—	—
Victoria Point	Extreme South of Lower Burma 0° 59' 00" N. 98° 32' 30" E.	VTV	300	Indian Government	300, 600, 700	P G ¹ ..	N	0.35	—	—
ITALIAN SOMALILAND										
Bardera	2° 21' 10" N. 42° 16' 15" E.	ISN	200	Government	700-750	P G ..	Sunrise to sunset	0.30 ¹	—	¹ The charge applicable to the transmission of radiotelegrams between the stations of Italian Somaliland is fixed at fr. 2.53 per radiotelegram.
Brava	1° 06' 25" N. 44° 02' 04" E.	ISC	200	Government	300-600	P G ..	Sunrise to sunset	0.30 ¹	—	

of ten words or less, with
fr. 0.25⁰⁰ additional for
each word over ten
* Italian Somaliland
official time, 3 hours in ad-
vance of Greenwich time

¹ Exclusively for the service of the steam ferry boats of the Strait of Messina

^a Radiotelegrams in plain language, Italian, French or English, concerning the movements and security of ships, and exchanged between the captains of ships and their owners or agents, are accepted

* This station is opened for public service direct to Italian Somaliland and Erythraea communicating with Mogadishio ISG (Italian Somaliland) and Massaua ICX (Erythraea)

* Maintains a continuous watch on 600 metre wave. Also performs a limited service for military purposes

**poses
' Serves Messina Radio
in the sector in which the
latter is "screened"**

[illegible]

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ITALY—contd.										
Catanzaro	Meridian of Greenwich.	G'IK	—	Army	—	O	—	—	—	* D.F. with transmitting apparatus. Ships requiring bearings should call Venezia Radio. † Serves for Messina Radio when the latter is occupied with military messages
Centocelle	41° 55' 00" N. 12° 27' 00" E.	ICD	—	—	—	—	—	—	—	
Centopozzi Radio	Puglie, Province of Foggia 41° 42' 00" N. 15° 36' 45" E.	ICM	160	Government	300, 600	P G	Sunrise to sunset	0.30	—	
Chiati	42° 05' 22" N. 11° 47' 33" E.	G'IH	—	Army	—	—	—	—	—	
Civitavecchia Radio	11° 47' 33" N. 12° 33' 33" E.	IDL	150	—	300, 600	P G	N	0.30	—	
Coltano	43° 38' 00" N. 10° 24' 00" E.	ICI	—	Government	6,500	O	—	—	—	
Cotrone Radio	39° 04' 54" N. 17° 08' 06" E.	IDH	30	—	300, 600	P G	N	0.30	—	
Cuneo	—	G'IC	—	Army	—	—	—	—	—	
Firenze	43° 40' 36" N. 11° 10' 25" E.	G'IF	—	Army	—	O	—	—	—	
Genova	—	G'IG	—	Army	600	—	Special	—	—	
Genova Radio	44° 25' 44" N. 8° 56' 02" E.	ICB	160	Government	300, 600	P G	N	0.30	—	
Lampédusa	35° 30' 56" N. 12° 37' 53" E.	—	—	—	—	—	—	—	—	
Lipari	38° 27' 48" N. 14° 57' 20" E.	—	—	—	300, 600	—	Special	—	—	
Livorno Radio	43° 33' 00" N. 10° 10' 00" E.	IDK	—	Government	—	—	—	—	—	
Maddalena Radio	Straits of Bonifacio, Maddalena Island 41° 12' 50" N. 9° 25' 10" E.	ICH	270	Government	300, 600	P G	N	0.30	—	
Marsala Radio	37° 51' 00" N. 12° 33' 00" E.	IDP	—	Government	—	—	—	—	—	
Messina Radio	38° 16' 01" N. 15° 37' 27" E.	ICF	150	Government	300, 600	P G	N	0.40	—	
Messina	38° 15' 00" N. 15° 37' 27" E.	IFM	27	Government (State Railways)	50	O ¹	—	—	—	
Milano	45° 20' 40" N. 9° 10' 05" E.	IGM	—	Army	—	O	—	—	—	

Locality	Co-ordinates	G.R./IRM	Army	Government	PG	Special	Notes
Milano	45° 27' 40" N. 12° 21' 22" E.	IRM	—	—	—	—	—
Murano R. G.	45° 30' 14" N. 14° 15' 36.5" E.	ICN	Government	300, 600	PG	N ⁴	0.30
Napoli Radio	40° 09' 00" N. 18° 30' 00" E.	ICN	Government	—	—	—	—
Novara	38° 11' 48" N. 13° 16' 40" E.	ICN	Government	—	—	—	—
Otranto Radio	36° 48' 00" N. 11° 57' 30" E.	ICN	Government	300, 600	PG	N	0.30
Padova	—	ICN	Government	600	—	Special	—
Palermo Radio	—	ICN	Government	—	—	—	—
Pantelleria	—	ICN	Government	—	—	—	—
Perugia	—	ICN	Government	—	—	—	—
Piacenza	—	ICN	Government	—	—	—	—
Pola	—	ICN	Government	—	—	—	—
Potenza	—	ICN	Government	—	—	—	—
Ravenna	—	ICN	Government	—	—	—	—
Reggio Calabria	—	ICN	Government	—	—	—	—
Roma	—	ICN	Government	—	—	—	—
Roma Centocelle	—	ICN	Government	—	—	—	—
Roma (S. Paolo) ^a	—	ICN	Government	—	—	—	—
Salerno	—	ICN	Government	—	—	—	—
Santa Cataldo Bari	—	ICN	Government	—	—	—	—
Santa Maria di Leuca	—	ICN	Government	—	—	—	—
Saseno Radio	—	ICN	Government	—	—	—	—
Spezia	—	ICN	Government	—	—	—	—
Stromboli Radio	—	ICN	Government	—	—	—	—
Taranto	—	ICN	Government	—	—	—	—
Tempio	—	ICN	Government	—	—	—	—
Tivoli Radio	—	ICN	Government	—	—	—	—
Torino	—	ICN	Government	—	—	—	—
Torino	—	ICN	Government	—	—	—	—
Treviso	—	ICN	Government	—	—	—	—
Trieste Radio	—	ICN	Government	—	—	—	—
Ustica	—	ICN	Government	—	—	—	—
Venezia Radio	—	ICN	Government	—	—	—	—
Verona	—	ICN	Government	—	—	—	—

Land Stations—Continued

Radio Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
ITALY—contd.										
Villa San Giovanni ..	Meridian of Greenwich. Calabria, Strait of Messina 38° 10' 00" N. 15° 38' 00" E.	IFV	27	Government (State Railways)	50	O ¹ ..	—	—	—	—
Vittoria Radio ..	Sicily, Province of Syracuse 36° 56' 50" N. 14° 31' 50" E.	ICV	270	Government ..	300, 800	P G ..	N	0.30	—	—
JAMAICA (See BRITISH WEST INDIES)										
JAPAN										
Choshi Radio ..	Hondo, Inuboye Point 35° 44' 08" N. 140° 51' 12" E.	JCS	Day 450 Night 1,500	Ministry of Communications	300, 600, 1,800	P G ¹² ..	N	0.60	—	¹ The station transmits each night (except Sundays) time signals on a wavelength of 600 metres. (See International Time and Weather Signals)
Dairenwan ..	Peninsula of Kwan-tung 38° 57' 50" N. 121° 53' 15" E.	JDA	Day 350 Night 1,200	—	300, 800	P G ¹² ..	N ¹	0.60	—	¹ The stations Choshi Radio, Fukutoku and Dairenwan transmit warnings of typhoons. No charge is made for these messages except when a special request of the ship. (See International Time and Weather Signals)
Fukutoku ..	Island of Formosa, Fumosa Strait 22° 18' 00" N. 121° 32' 00" E.	JFK	Day 400 Night 1,260	Ministry of Communications	300, 800	P G ¹² ..	N	0.60	—	¹ The stations Choshi Radio, Fukutoku and Dairenwan transmit warnings of typhoons. No charge is made for these messages except when a special request of the ship. (See International Time and Weather Signals)
Funabashi Radio ..	Yedo Bay, near Funabashi	JJC	—	Ministry of Marine and Ministry of Communications	4,000-7,000	P G ¹² O ¹	—	—	—	¹ This station includes the charge applicable to the transmission on the lines of the Japanese telegraph service of radio messages or intended for the employment of ships. (See International Time and Weather Signals)
Horomushiro Radio ..	Paramousir Island 50° 29' 20" N. 156° 30' E.	JHJ	Day 450 Night 1,500	Ministry of Communications	300, 800	P G ¹²	N ¹²	0.60 ¹⁴	—	¹ This station includes the charge applicable to the transmission on the lines of the Japanese telegraph service of radio messages or intended for the employment of ships. (See International Time and Weather Signals)
Komonto ¹ ..	Chosen Island, Komonto ¹ 34° 05' N. 126° 36' 12" E.	JKM	Day 200 Night 300	—	—	—	N	—	—	¹ This station includes the charge applicable to the transmission on the lines of the Japanese telegraph service of radio messages or intended for the employment of ships. (See International Time and Weather Signals)
Maizuru Radio ..	Wakasa Bay, near Maizuru	JMZ	—	Ministry of Communications	300, 600, 900-3,500	P G ..	N	0.60	—	¹ This station includes the charge applicable to the transmission on the lines of the Japanese telegraph service of radio messages or intended for the employment of ships. (See International Time and Weather Signals)

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Land Stations—Continued

Name.	Geographical Position	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
JUGO-SLAVIA	Meridian of Greenwich							Francs.	Francs.	
Belgrade ..	44° 47' 57" N. 20° 21' 57.5" E.	HFB	—	—	6,000 to 7,000 (c.w. arc)	— ¹	N	—	—	¹ Communicates only with fixed stations
Sarajevo ..	43° 52' 00" N. 18° 26' 00" E.	HFC	—	—	2,600 to 6,000 and 600 to 2,800 (c.w.)	— ¹	X	—	—	¹ Sends meteorological message at 1345 hours daily
LATVIA										
Libau RED ..	56° 30' 00" N. 21° 05' 00" E.	RED	—	—	360	O	—	—	—	
Libau ROL ..	Baltic Sea 56° 31' 40" N. 20° 30' 00" E.	ROL	170	—	300, 420, 800	P G	0600 to 2200	0.60	—	
Riga ..	56° 59' 53" N. 24° 06' 15" E.	RRG	160	—	300, 420, 800	P G ¹	0600 to 2200	0.60	—	
LIBERIA										
Monrovia ..	6° 16' 40" N. 11° 49' 36" W.	FMA	400	French Government	600	P G	Su rise to sunset	0.30	—	
MADAGASCAR										
Ambohibe ¹ ..	—	—	—	—	—	—	—	—	—	¹ The station also communicates by radiotelegraphy with Daoudzi.
Diégo-Suarez ..	North of Madagascar 12° 15' 04" S. 49° 22' 14" E.	FDG	Day 325 Night 650	French Government	300, 800	P G ¹ O	0700 to 1100 ² 1330 to 1700 1900 to 2100	0.50	—	In case of interruption of the inland telegraph lines, the Diégo-Suarez and Majunga stations exchange by radiotelegraphy the inland and international correspondence
Maintirano ¹ ..	18° 11' 00" S. 44° 00' 00" E.	—	—	—	—	—	—	—	—	² A service giving warning of the passage of cyclones has been organised as an experiment, on the east, north-west, and west coasts of Madagascar
Majunga ..	Mozambique Channel 15° 43' 00" S. 46° 20' 14" E.	FJA	430	French Government	300, 800	P G ¹	0700 to 1100 ² 1330 to 1700 1900 to 2000	0.50	—	² Third time belt east of the Greenwich belt
Tananarive ¹ ..	18° 55' 00" S. 47° 30' 00" E.	—	—	—	—	—	—	—	—	¹ Under construction
Tulcar ¹ ..	43° 45' 00" E.	—	—	—	—	—	—	—	—	

Station	Frequency	Power	Service	Remarks
MALAY PENINSULA				
Penang Radio	5° 31' 00" N. 100° 23' 00" E.	350 Night	Day	—
Singapore (Seletar)	1° 24' 00" N. 103° 51' 00" E.	1,000	British Admiralty	—
Singapore Radio	1° 18' 00" N. 103° 51' 00" E.	350 Night	Straits Settlements Government	—
MALTA				
Malta Island (St. George's)	35° 55' 17" N. 14° 20' 24" E.	200	Eastern Telegraph Co.	—
Rinella Bay, Malta	35° 53' 00" N. 14° 32' 00" E.	—	British Admiralty	—
S. Angelo, Malta	35° 53' 00" N. 14° 31' 00" E.	500	British Admiralty	—
MARIANNE ISLANDS				
Guam ¹	13° 27' 15" N. 144° 44' 42" E.	150	U.S. Navy	—
MARSHALL ISLANDS				
Nauru	Pleasant Island 0° 25' 24" S. 166° 56' 00" E.	2,000	Australian Government	—
MARTINIQUE				
Fort de France	14° 35' 50" N. 61° 04' 00" W.	400	French Navy	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge		Remarks.
								Per Word.	Minimum Charge.	
MAURITIUS	Meridian of Greenwich.							Francs.	Francs.	
Mauritius ..	20° 10' 00" S. 57° 35' 00" E.	BZG	500	British Admiralty	600-2,000 (spk) 4,000 (arc)	P G ¹ ..	N	0.60	—	¹ Weather reports from ships are sent to the observatory. If necessary, the observatory forwards a weather report to ships at sea
MEXICO							Mean time of the meridian of Tacubaya. ¹			
Acapulco de Guerrero	16° 50' 41" N. 99° 54' 26" W.	XAK	300	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	¹ Mean time of the meridian of Tacubaya: six hours 36 minutes 46.67 seconds later than Greenwich time
Alamos de Sonora ..	27° 01' 19" N. 108° 55' 59" W.	XAD	500	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	² The station also exchanges ordinary telegrams originating in or intended for the peninsula of Yucatan
Campeche ..	10° 40' 47" N. 90° 32' 11" W.	XAB	300	Government	300, 600, 900, ² 1,200 ³	P G ^{2,3} ..	0800 to 2200	0.45	4.50	³ The station transmits daily at noon, time signals and a weather report. (See International Time and Weather Signals)
Chapultepec (Mexico City)	19° 30' 00" N. 99° 30' 00" W.	XDA	—	Government	—	—	—	—	—	⁴ The station also exchanges ordinary telegrams originating in or intended for Lower California
Guaymas ..	27° 55' 30" N. 110° 53' 34" W.	XAH	200	Government	300, 600, 900, ² 1,200 ³	P G ² ..	0800 to 2200	0.45	4.50	⁵ For correspondence with fixed stations
La Paz de la Baja California	24° 10' 12" N. 110° 21' 05" W.	XAF	300	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	
Mazatlán de Sinaloa	23° 11' 55" N. 106° 25' 20" W.	XAE	300	Government	300, 600, 900, ² 1,200 ³	P G ^{2,3} ..	0800 to 2200	0.45	4.50	
Merida de Yucatan	20° 58' 05" N. 89° 37' 27" W.	XAM	300	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	
Payo Obispo ..	18° 29' 39" N. 88° 21' 30" W.	XAC	300	Government	300, 600, 900, ² 1,200 ³	P G ² ..	0800 to 2200	0.45	4.50	
Puerto Lobos	21° 28' 00" N. 97° 13' 03" W.	XAL	300	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	
Salina Cruz ..	16° 09' 37" N. 95° 12' 11" W.	XAN	300	Government	300, 600	P G ..	0800 to 2200	0.45	4.50	
S. Rosalia de la Baja California	27° 24' 00" N. 112° 20' 00" W.	XAG	100	Government	300, 600	P G ⁴ ..	0800 to 2200	0.45	4.50	
Tampico de Tamaulipas	22° 13' 00" N. 97° 51' 19" W.	XAJ	300	Government	300, 600, 900, ² 1,200 ³	P G ..	0800 to 2200	0.45	4.50	

Station	Lat.	Long.	Alt.	Govt.	Power	Frequency	Remarks
Taxpan de Veracruz	20° 57' 18" N.	97° 23' 59" W.	300	Government	300, 600, 900, 1,200	P G	4.50
Veracruz de Veracruz	19° 12' 02" N.	96° 08' 16" W.	500	Government	300, 600, 900, 1,200	P G ¹	4.50
MOROCCO							
Agadir	30° 26' 15" N.	9° 36' 30" W.	500	Navy (French)	600, 800, 1,000	O	—
Casablanca, Maroc	33° 36' 30" N.	7° 37' 00" W.	600	Navy (French)	600, 700, 800, 1,000	O & P	0.25 ¹ (a)
Chetaba Gmlo	30° 35' 21" N.	7° 38' 10" W.	—	Navy (French)	450, 600	D F ¹	—
Ceuta	35° 48' 40" N.	5° 16' 24" W.	320	Army (Spanish)	900, 1,200, 1,590	O	—
Fez	—	—	—	French Government	—	O	—
Kenitra	—	—	150	Navy (French)	800, 800	O	—
Larache	35° 12' 00" N.	6° 12' 00" W.	220	Army (Spanish)	600, 900, 1,200	O	—
Médiouna	33° 27' 15" N.	7° 31' 20" W.	—	Navy (French)	3,000	—	—
Melilla	35° 18' 15" N.	3° 56' 25" W.	320	Army (Spanish)	600, 1,200, 1,600	O	—
Mogador	33° 35' 50" N.	9° 46' 00" W.	400	French Government	800, 800, 1,000	P	0.25 ¹ (b)
Rabat	34° 02' 15" N.	6° 50' 30" W.	110	French Government	450	O	—
Tanger	35° 46' 12" N.	5° 49' 30" W.	430	French Government	300, 600	P G	0.25 ¹ (c)
Tetuan	36° 45' 50" N.	5° 22' 50" W.	320	Army (Spanish)	900, 1,200, 1,590, 2,000	O	—
NAVASSA ISLAND							
Navassa Island	Windward Passage	18° 25' 00" N. ¹ 74° 00' 00" W.	125	U.S. Navy	300, 600	P G	0.30
NETHERLANDS							
Amsterdam	52° 22' 27" N. 4° 54' 45" E.	—	—	Government	—	O	—
Apeldoorn (Gelderland)	—	—	—	—	—	—	—
Commandementsgebouw Willemsoord	52° 57' 49.5" N. 4° 46' 33" E.	—	—	—	—	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
NETHERLANDS										
De Mok	Meridian of Greenwich. 53° 01' 00" N. 4° 45' 00" E.	PCE	40	—	—	O ..	X	—	—	such ships, of telegrams sent to it through the Scheveningen-Port coast station; (b) meteorological services.
Doggersbank Noord Lightship	56° 00' 00" N. 5° 00' 00" E.	PCP	100	Government	300, 400, 600	— ¹	X	— ¹	—	¹ Telegrams originating on or intended for ships and forwarded through Scheveningen-Port are subject to the charge for land telegraph lines, and a fixed charge of fr. 1.00 per telegram.
Doggersbank Zuid Lightship	54° 45' 00" N. 3° 58' 30" E.	PCR	100	Government	300, 400, 600	— ¹	X	— ¹	—	² The station transmits daily except Sundays and holidays a meteorological telegram on the wavelength of 1,800 metres. (For particulars, see International Time and Weather Signals — Holland)
Flushing	51° 29' 00" N. 3° 37' 00" E.	PCD	200	—	—	O ..	X	—	—	³ For radiotelegrams to and from ships licensed by the Commonwealth of Australia and New Zealand Administrations
Haaks Lightship ..	To the West of Helder 52° 58' 00" N. 4° 18' 31" E.	PCO	80	Government	400, 600	— ¹	X	— ¹	—	⁴ Under construction
Helder	52° 57' 44" N. 4° 46' 38" E.	PCB	—	Government	—	O ..	—	—	—	¹ The station is connected with the International Telegraph System by wireless through Woodlark Island and Townsville Radio
Hellevortsluis ..	51° 49' 30" N. 4° 08' 00" E.	PPC	—	Government	—	O ..	—	—	—	² For radiotelegrams to and from ships licensed by the Commonwealth of Australia and New Zealand Administrations
Kazerne Onderzeedienst Willemsoord	52° 57' 05" N. 4° 46' 23" E.	—	—	—	—	—	—	—	—	³ For radiotelegrams to and from ships licensed by other Administrations
Noord-Hinder Lightship	North Sea 51° 35' 30" N. 5° 35' 30" E.	PCN	40	Government	400	— ¹	X	— ¹	—	
Scheveningen-Port ..	North Sea Coast, near The Hague 52° 06' 00" N. 4° 15' 55" E.	PCH	250	Government	300, 500, 600, 1,800	P G ¹ ..	N	0.40	4.00	
Terschellingbank Lightship	53° 29' 00" N. 4° 02' 00" E.	PCM	80	Government	300, 400, 600	— ¹	X	— ¹	—	
Wachtschip Vlissingen	51° 26' 52" N. 3° 35' 35" E.	—	—	—	—	—	—	—	—	
NEW BRITAIN										
Rabaul Radio ..	4° 23' 50" S. 152° 18' 15" E.	VJZ	2,000	Australian Government	300, 450, 600	P G ¹ ..	N	0.30 ¹ 0.80 ²	—	

NEW CALEDONIA
(See FRENCH OCEANIA)

NEWFOUNDLAND	Belle Isle ..	VCM	250	Marconi Co. of Canada	300, 600	P G ¹ ..	N	0.30	—	¹ The station transmits weather forecasts. (See International Time and Weather Signals)
	Cape Race	VCE	500	Marconi Co. of Canada	300, 600, 1,600	P G ¹ ..	N	0.85	—	² Independent direction finding station
	Cape Race, D F ²	VAZ	250	—	800	D F ² ..	—	—	—	³ The station is open for public correspondence in the inland service
	Cape Ray ..	VCR	350	Marconi Co. of Canada	300, 600, 1,600	P G ¹ ..	N	0.30	—	⁴ Atlantic standard time, 4 hours later than Greenwich time
	Fogo ..	VOJ	250	Marconi Co. of Canada	800, 600	— ³	0800 to 2000 ⁴	0.85	—	⁵ The station is only open during the season of navigation approximately April to December
	Point Riche ..	VCH	250	Marconi Co. of Canada	300, 600	P G ¹ ..	N ⁵	0.30	—	
	St. Johns ..	BZM	1,000	British Admiralty	600-2,000 (spk) 4,000, 4,200, 5,000 (arc)	O ..	—	—	—	
		VZX	200	Australian Government	—	P G ..	—	0.60	—	¹ The station is connected to the International Telegraph System through Port Moresby and Thursday Island Radio by wireless
		VIV	200	Australian Government	—	P G ¹ ..	—	0.60	—	² When necessary, or when requested by vessels, the station transmits weather forecasts
		VZK	200	Australian Government	—	P G ..	—	0.60	—	³ The station is connected to the International Telegraph System by wireless through Thursday Island Radio
NEW GUINEA	Port Moresby Radio	VIG	500	Australian Government	300, 450, 600	P G ² ..	N	0.30 ⁴ 0.60 ⁴	—	⁴ In the case of radiotelegrams originating at or intended for Port Moresby the local land charge is included in the coast tax
	Samarai Radio	VIJ	350	Australian Government	—	P G ..	—	0.60	—	⁵ For radiotelegrams exchanged with ships subject to the administration of Australia or of New Zealand
										⁶ For radiotelegrams exchanged with ships other than those subject to the administration to the administration of Australia or of New Zealand
NEW HEBRIDES (See FRENCH OCEANIA)										

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
NEW IRELAND										
Kaewiang ..	Meridian of Greenwich. 2° 45' 00" S. 151° 02' 00" E.	VZR	200	Australian Government	300, 800	P G ..	1800 to 0600 ¹	Franks. 0.30 ^a 0.60 ^a	Franks.	¹ Mean time of the meridian 142° 30' E. of Greenwich ² For radiotelegrams to and from ships licensed by the Commonwealth of Australia or New Zealand Administration ³ For radiotelegrams to and from ships other than that licensed by the Australian or New Zealand Administration
NEW ZEALAND										
Auckland Radio ..	36° 50' 36" S. 174° 46' 08" E.	VLD	Day 300 Night 600	Government ..	300, 800, 1,000	P G ..	Mean time of New Zealand. ¹ 1900 to 0600	0.57.8 ^a 0.26.3 ^a	—	¹ Mean time of New Zealand, 11 hours 30 minutes in advance of Greenwich time ² In addition a continuous listening service for distress signals will be maintained
Awanui Radio ..	Auckland, Mongonui 34° 54' 00" S. 173° 18' 00" E.	VLA	Day 300 Night 600	Government ..	300, 800, 1,800, 2,500, 3,500	P G ⁴ ..	1830 to 2400 ²	0.57.8 ^a 0.26.3 ^a	—	³ Rate applicable to messages to or from vessels trading to ports outside Australasia ⁴ Rate applicable to messages to or from vessels trading exclusively (a) between New Zealand and Australia, and (b) on the New Zealand coast
Awarua Radio ..	Otago, near Bluff Harbour 46° 30' 00" S. 168° 23' 00" E.	VLB	Day 300 Night 600	Government ..	300, 800, 2,000, 2,500, 3,500	P G ..	1800 to 2400 ²	0.57.8 ^a 0.26.3 ^a	—	⁵ Radiotelegrams can be sent from ships to Chatham Islands to be relayed by that station to a coast station situated in
Chatham Islands ..	47° 57' 00" S. 176° 31' 00" W.	VLC	300	Government ..	300, 800	P G ..	0900 to 1300 1500 to 1700 1900 to 2400	0.57.8 ^a 0.26.3 ^a	—	
Wellington Radio ..	41° 17' 05" S. 174° 46' 39" E.	VLW	325	Government ..	300, 800	P G ..	1900 N	0.57.8 ^a 0.26.3 ^a	—	

NIGARAGUA		13° 15' 00" N. 86° 01' 00" W.	NAZ	100	U.S. Navy	600,754,952	O	N	0.30	—	—
Managua					African Direct Cable Co.	300, 800	P G	0700 to 2100 Sundays: 0800 to 1800 1600 to 1800	0.60	—	—
NIGERIA		6° 26' 36" N. 3° 23' 57" E.	VPY	250	Government	300, 800	P G	Central European Time, N	0.28	2.80	—
Bergen Radio		North Sea Coast 60° 24' 30" N. 5° 22' 00" E.	LGN	Day 270 Night 1000	Government	300, 800	P G	—	—	—	—
Bjørnøen Radio		Arctic Ocean 74° 27' 45" N. 19° 17' 15" E.	LWP	225	Bjørnøen A/S Sta- vanger	1,600, 600	P R ¹	—	—	—	—
Fauske ²		67° 18' 00" N. 15° 40' 00" E.	—	—	—	600, 2,000	—	—	—	—	—
Flekkerøy Radio		Skagerak 58° 04' 05" N. 7° 59' 00" E.	LDF	Day 160 Night 50	Government	300, 800	P G	N ¹	0.28	2.80	—
Ingøy Radio		To the West of North Cape 71° 04' 25" N. 24° 09' 20" E.	LEI	480	Government	300, 800	P G	N ² 0800 to 2100 ³	0.40	4.00	—
Karl Johansvern Radio		Kristiania Fjord 59° 25' 45" N. 19° 07' 45" E.	LBZ	—	Government	—	O	—	—	—	—
Kings Bay ⁴		79° 01' 00" N. 14° 00' 00" E.	—	—	—	300, 600, 1,800	—	—	—	—	—
Kristiania Radio		Near Kristiania 59° 25' 45" N. 19° 07' 45" E.	LCH	—	Government	—	O	—	—	—	—
Røst Radio		Lofoten Islands 67° 30' 24" N. 12° 04' 45" E.	LFR	35	Government	300, 800	P G ⁴	0900 to 1300 1200 to 1930 Holidays: 0800 to 1000	0.28	2.80	—
Sørvaagen Radio		Lofoten Islands 67° 53' 30" N. 13° 02' 00" E.	LEN	35	Government	300, 800	P G ⁴	0900 to 1300 1600 to 1930 Holidays: 0800 to 1000	0.28	2.80	—
Stavanger Radio		58° 48' 00" N. 5° 45' 00" E.	LCM	—	Government	—	— ⁵	—	—	—	—

¹ The night service is performed alternately by the Flekkerøy Radio and the Tjome stations. Flekkerøy Radio is open during the nights of Tuesday, Thursday and Saturday. Tjome is open during the nights of Monday, Wednesday, and Friday. The service between 0800 Sunday and 0800 Monday is performed alternately by the two stations.

² During the months from May to September.

³ During the months from October to April.

⁴ Røst and Sørvaagen intercommunicate by wireless.

⁵ Trans-Atlantic public service to U.S.A.

⁶ For communication with Sørvaagen and Røst Radio.

⁷ For communication with Ingøy Radio.

⁸ Under construction.

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
NORWAY—<i>contd.</i>										
Tjømø Radio	Meridian of Greenwich. Kristiania Fjord 58° 03' 05" N. 16° 24' 05" E.	LET	Day 160 Night 50	Government	600	P G ..	N ¹	Frans. 0.23	Frans. 2.80	
Trondhjem *	63° 25' 00" N. 10° 25' 00" E.	—	—	—	—	—	—	—	—	
Utsire Radio	North Sea Coast 59° 18' 10" N. 4° 55' 08" E.	LGK	230	Government	300, 600	P G ..	N	0.28	2.80	
Værøy Radio	62° 40' 20" N. 12° 41' 30" E.	—	—	Government	—	P R *	—	—	—	
PANAMA										
Balboa	Pacific entrance of the Panama Canal 8° 57' 00" N. 79° 33' 30" W. 7° 30' 00" N. ¹ 80° 00' 00" W.	NBA	150	U.S. Navy	300, 600	P G ..	N	0.30	—	¹ Approximately
Cape Malai	79° 33' 30" W. 7° 30' 00" N. ¹ 80° 00' 00" W.	NNT	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Coco Solo	9° 23' 10" N. 79° 53' 11" W.	NNL	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Colon	Atlantic entrance of the Panama Canal 9° 22' 08" N. 79° 53' 07" W. 9° 07' 15" N. 79° 46' 20" W.	NAX	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Darien Panama	8° 30' 00" N. ¹ 78° 14' 00" W.	NBA	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
La Palma	8° 30' 00" N. ¹ 78° 14' 00" W.	NNW	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Puerto Obaldia	9° 33' 00" N. ¹ 79° 13' 00" W.	NRK	250	U.S. Navy	300, 600	P G ..	N	0.30	—	

**1 Communicates also
with Bushire**
**2 Communicates also
with Basrah and Bahrein**
**3 Communicates also
with Henjam**

¹ The station is preferred to receive calls chiefly during the first 15 minutes of each of its hours of service.

² The coast charge given is applicable to radiotelegrams worded in plain Spanish language; for radiotelegrams in code or worded in language other than Spanish the coast charge is doubled.

³ Interior station

⁴ Under construction

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
PERU—contd.										
Putumayo ^a ..	Meridian of Paris. 2° 05' 00" S. 72° 46' 00" W.	OAU	600	Government	2,000	P G ..	1900 to 2400	Frans. 0.24 ^a	Frans.	¹ Mean time of the meridian 120° east of Greenwich ² Stations have been dismantled for re-erecting on other sites. ³ Under construction
Requena ^a ..	8° 28' 00" S. 76° 13' 00" W.	OAQ	240	Government	2,000	P G ..	0600 to 1700	0.21 ^a	—	
Salaverny ⁴ ..	—	—	—	—	—	—	—	—	—	
San Cristobal (Lima)	12° 03' 06" S. 79° 22' 54" W.	OAZ	900	Government	600, 1,500, 2,000, 3,000, 3,500, 4,000	P G ..	0800 to 2400	0.12 ^a	—	
Trujillo ..	—	OAT	—	Government	600, 1,500	P G ..	—	0.12 ^a	—	
PHILIPPINE ISLANDS										
Balabac ^a ..	Meridian of Greenwich. Palawan Islands	—	—	—	—	—	Mean time of the Islands. ¹	—	—	
Batangas ..	Luzon	KUXK	—	Government	—	—	—	—	—	
Bongao ^a ..	Sulu	—	—	Government	—	—	—	—	—	
Cagayan Sulu ^a ..	Sulu	—	—	Government	—	—	—	—	—	
Canotes Islands ^a ..	Cebu Islands	NPO	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Cavite ..	14° 28' 59" N. 120° 54' 35" E.	—	—	—	—	—	—	—	—	
Cebu ..	Cebu Islands	KUXJ	—	Government	—	—	—	—	—	
Ciabo ^a ..	120° 25' 00" N. 123° 50' 00" E. 6° 51' 00" N.	CB	50	Government	600	P G ..	0800 to 1730	0.30	—	
Cullon ^a ..	126° 04' 00" E. Palawan Island	—	—	—	—	—	—	—	—	
Cuyo ..	10° 50' 00" N. 121° 00' 00" E.	WVX	150	Government	600, 1,200	P G ..	0700 to 1815	0.30	—	
Davao ^a ..	121° 00' 00" E. Mindanao	WVO	200	U.S. Army	600, 1,200	P G ..	N	0.30	—	
Fort Drum ..	7° 08' 00" N. 123° 36' 00" E. Manila Bay, El Fraile Island	WVP	30	U.S. Army	430	O ..	—	—	—	
Fort Frank ..	14° 18' 23" N. 120° 37' 43" E. Cebu Bay, Cebu Island	WVL	50	U.S. Army	—	P G ..	—	0.30	—	

	WVM	U.S. Army	600	P G	600	P G	—	0.30
Fort Hughes	Manila Bay, Caballo Island	U.S. Army	600	..	300, 800, 825, 1,200	P G	—	0.30
Fort Mills WVN	Manila Bay, 14° 22' 52" N. 120° 34' 40" E.	U.S. Army	500	..	600	O	—	—
Fort Mills WVZ	Manila Bay, Corregidor Island	U.S. Army	125	..	1,200	O	—	—
Fort Wint ..	14° 22' 52" N. 120° 34' 40" E.	U.S. Army	125	..	600	O	—	—
Fort Wm. McKinley	Manila Bay, Grande Island 14° 46' 15" N. 120° 13' 25" E.	U.S. Army	125	..	600	O	—	—
Iloilo ..	Luzon 14° 33' 40" N. 121° 05' 00" E.	Government	—	..	—	—	—	—
Isabel de Basilan ..	Panay 10° 40' 00" N. 122° 35' 00" E.	Government	20	..	200	P G	—	0.30
Jolo ..	16° 40' 00" N. 121° 50' 50" E.	Government	200	..	600	P G	—	0.30
Malabang ..	Jolo Island 6° 10' 00" N. 121° 00' 00" E.	Government	200	..	800, 1,200	P G	—	0.30
Malangas ..	Mindanao 7° 00' 00" N. 124° 05' 00" E.	—	—	..	—	—	—	—
Manila ..	Davao Luzon 14° 35' 48" N. 120° 38' 47" E.	U.S. Army	200	..	600	O	—	—
Margosatubig ..	12° 31' 15" N. 122° 11' 56" E.	Government	150	..	600, 900	P G	—	0.30
Olongapo ..	14° 49' 46" N. 120° 16' 37" E.	U.S. Navy	200	..	300, 800	O	—	—
Port Lebac *	Cotabato	Government	—	..	—	—	—	—
Puerto Princesa ..	Paragua 9° 40' 00" N. 118° 40' 00" E.	Government	150	..	800, 1,200	P G	—	0.30
San José, Mindoro ..	12° 20' 00" N. 121° 00' 00" E.	Government	200	..	600	P G	—	0.30
Zamboanga ..	Mindanao 6° 50' 00" N. 122° 05' 00" E.	Government	400	..	800, 1,200	P G	—	0.30
WAR	—	—	—	..	800, 2,000 800, 2,000 800, 2,000	O O O	— — —	— — —
POLAND	—	—	—	..	—	—	—	—
Cracow ..	—	—	—	..	—	—	—	—
Posen ..	—	—	—	..	—	—	—	—
Warsaw ..	—	—	—	..	—	—	—	—

POLAND

Cracow
Posen..
Warsaw

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
PORTO RICO	Meridian of Greenwich.							Frans.	Frans.	
	12° 59' 00" N. ¹ 66° 57' 00" W.	NZR WPR	2,500 150	U.S. Navy U.S. Navy	300, 600, 1,610	P G ..	0800 to 1200 1400 to 1700 Sundays 0900 to 1200 1900 to 2000 N	— 0.30	—	¹ Operated by the United States Naval Communication Service, Radio Virginia ² Trans-oceanic service ³ Approximately
	San Juan, Porto Rico ¹	NAU	250	U.S. Navy	300, 600	P G ..		0.30	—	
PORTUGAL										
	38° 47' 11" N. 9° 23' 22" W.	PQL	190	Government	300, 450, 600	P G ..	N	0.40	—	¹ A direction finding service is carried out by this station when not engaged in official correspondence
	38° 44' 00" N. 9° 16' 00" W.	CTV	—	Navy ..	300, 450, 600, 900, 1,200	O, D F ¹	—	—	—	
	41° 10' 35.7" N. 8° 42' 15.9" W.	PQP	400	Government	300, 600, 900, 1,200	P G ..	N	0.40	—	
PORTUGUESE EAST AFRICA										
	Province of Mozambique 23° 51' 55" S. 35° 22' 50" E.	CRY	300	Government	300, 600	P G ..	0800 to 2400 ²	0.60	—	¹ Station operated by the Postal and Telegraphical administration of the district of Mozambique ² Mean time of the meridian 30° east of Greenwich
	Province of Mozambique 25° 58' 05" S. 32° 35' 39" E.	CRZ	300	Government	300, 600	P G ² ..	N	0.60	—	The station transmits daily, at 10.00 and 21.00, time signals and information concerning the meteorological conditions, furnished by the observatory of Campos Rodrigues (Lourenço Marques). (See International Time and Weather Signals)
	Province of Mozambique 15° 01' 47" S. 40° 45' 06" E.	CRV	300	Government	300, 600	P G ..	N	0.60	—	
Mozambique¹										

PORTUGUESE
GUINEA

Bissau ¹	..	11° 52' 00" N.
	..	15° 37' 00" W.
Bolama ¹	..	11° 35' 00" N.
	..	15° 30' 00" W.
Caio ¹	..	11° 50' 00" N.
	..	16° 24' 00" W.

ROUTINIA

Baneasa (Bucharest)
Constantza-Tunnel ..

RUSSIA

Anadyr	..	Behring Sea
	..	64° 34' 00" N.
	..	175° 33' 00" E.
Arkhangel	..	Mouth of the Dwina
	..	64° 32' 00" N.
	..	40° 30' 00" E.
Batoum	..	Black Sea
	..	41° 36' 00" N.
	..	41° 40' 00" E.

Fort d'Alexandrovsk

Caspian Sea
44° 30' 14" N.
50° 16' 40" E.

.. River Amgoun, a tributary of the Amur
Kerbinskaia 52° 20' 07.3" N.
136° 20' 18" E.

Kerch	..	Crimea	45° 18' 00" N. 36° 27' 00" E.
Kronstadt	..		59° 59' 00" N. 29° 47' 00" E.
Mare-Sale	..	Kara Sea, Yalman Peninsula	69° 42' 59" N. 66° 48' 38" E.

Government	300, 600, 1,200, 1,600	—	—	—	—	1 Under construction
Government	300, 600, 900	—	—	—	—	
Government	300, 600, 900	—	—	—	—	
Government	—	600	P R ¹ ..	N ²	—	¹ Public correspondence limited to the ships Dacia CVD, Imperatul Traian, Principesa Maria, Regele Carol I and Roumania
Government	—	—	—	—	—	² During the voyages of the Roumanian ships
—	300, 420, 600	P G ..	Time of Petrograd ⁷ 1100 to 1900	0.60	—	The coast station charge is reduced to fr. 0.13 per word for correspondence with Russian ship stations
—	300, 420, 600	P G ..	0800 to 1000 1200 to 1400 2000 to 2400	0.60 ¹	—	³ The station communicates only with Nicotewsk RNL
—	—	O ..	—	—	—	⁴ The station also communicates by radiotelegraphy with Kerpinskala
—	300, 420, 600	P G ..	0550 to 0950 1150 to 1550	0.60	—	⁵ The station is only open during the season of navigation
—	—	— ⁸	X	—	—	⁶ For radiotelegrams exchanged between the stations Rade de Taganrog and Taganrog, there is an additional charge of fr. 0.40 per radiotelegram, plus fr. 0.025 per word
—	—	O ..	—	—	—	⁷ The station is reserved for the service of the Gulf of Riga
—	360	O ..	—	—	—	⁸ Two hours in advance of Greenwich time
—	300, 420, 600	P G ..	0800 to 1000 1200 to 1400 2000 to 2400	0.60 ¹	—	⁹ Temporarily controlled by British Admiralty
						¹⁰ Transmits press and a meteorological message

The coast station charge is reduced to fr. 0.13 per word for correspondence with Russian ship stations

³The station communicates only with Nicolaiewsk RNL

• The station also communicates by radiotelegraphy with Kerbinskaya

* The station is only open during the season of navigation

For radiotelegrams exchanged between the stations Rade de Taganrog and Taganrog

there is an additional charge of fr. 0.40 per radiotelegram, plus fr.

0.025 per word

**of Riga
, Two hours in advance
of Greenwich time**

Temporarily controlled by British Admiralty

• Transmits press and a meteorological message

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge	
RUSSIA—cont.	Meridian of Greenwich.									
Moscow	61° 33' 00" N.	MSK	—	Government	5,000	—	—	—	—	
Nalakan	159° 50' 00" E.	RNN	130	—	300, 420, 800	P G ..	1100 to 1900	0.60	—	
Nicolaïevsk RAU	On the Amur	RAU	—	—	—	—	—	—	—	
Nicolaïevsk RNL	Mouth of the Amur	RNL	240	—	300, 800	O P G* ..	N	0.60	—	
Odessa	53° 08' 19.3" N.	—	—	—	—	—	—	—	—	
Okhotsk	140° 42' 54.4" E.	—	—	—	—	—	—	—	—	
Pétropavlovsk	Sea of Okhotsk	RAR	—	—	—	—	—	—	—	
	59° 22' 00" N.	ROT	130	—	300, 420, 800	O P G ..	0500 to 2100	0.60	—	
	143° 20' 00" E.	—	—	—	—	—	—	—	—	
Petrograd (Tsarskoe-Selo)	Kamchatka	RPK	240	—	300, 800	P G ..	N	0.60	—	
Pétrowsk Daghestan	53° 00' 10" N.	—	—	—	—	—	—	—	—	
	158° 38' 45" E.	TSR	—	Government	—	—	—	—	—	
Prest	Coast of the Caspian Sea	ROK	160	—	300, 420, 800	P G ..	0550 to 0950 1150 to 1550	0.60	—	
	42° 59' 20" N.	—	—	—	—	—	—	—	—	
	47° 30' 00" E.	REF	—	—	360	O ..	—	—	—	
Rade d'Astrakhan	Aland Islands	—	—	—	—	—	—	—	—	
	60° 16' 00" N.	—	—	—	—	—	—	—	—	
	20° 21' 00" N.	RQT	110	—	300, 420, 800	P G ..	0550 to 2150 1150 to 1550	0.13	—	
	Caspian Sea	—	—	—	—	—	—	—	—	
	45° 15' 00" E.	—	—	—	—	—	—	—	—	
Rade de Taganrog	Sea of Azov	ROE	110	—	300, 420, 800	P G ..	0600 to 2200	0.60 1*	—	
	42° 25' 00" E.	—	—	—	—	—	—	—	—	
	46° 59' 30" N.	—	—	—	—	—	—	—	—	
Reval..	38° 14' 10" E.	—	—	—	—	—	—	—	—	
	59° 20' 00" N.	ROR	170	—	300, 420, 800	P G ..	0600 to 2200	0.60	—	
	24° 20' 00" E.	—	—	—	—	—	—	—	—	
Rouno	Gulf of Riga	RRN	70	—	300, 420, 800	P G ..	0800 to 1200 1400 to 1700 2000 to 2100	0.60	—	
	57° 48' 00" E.	—	—	—	—	—	—	—	—	
Sébastopol	24° 15' 00" N.	REG	—	—	360	O ..	—	—	—	
	44° 37' 40" N.	—	—	—	—	—	—	—	—	
	44° 37' 40" N.	—	—	—	—	—	—	—	—	
Taganrog	Sea of Azov	RRT	170	—	300, 420, 800	P G* ..	0600 to 2200	0.60 1*	—	
	33° 33' 00" E.	—	—	—	—	—	—	—	—	
	38° 48' 00" N.	—	—	—	—	—	—	—	—	

Valgatch	RTV	150	—	300, 420, 800	P ¹ U	1200 to 1400 1500 to 1700 2000 to 2400	—	—	—
Valgatch Island Kara Strait									
76° 23' 46" N. 58° 48' 00" E.									
43° 06' 00" N. 131° 54' 00" E.	NPH	—	U.S. Navy	—	—	—	—	—	—
43° 06' 49" N. 131° 53' 22" E.	RAS	—	—	1,200 approxi- mately 360	O	—	—	—	—
61° 00' 00" N. 28° 49' 00" E.	REJ	—	—	—	O	—	—	—	—
61° 00' 00" N. 28° 49' 00" E.	RAW	—	—	1,200 approxi- mately	O	—	—	—	—
Kara Sea, Jugor Strait	RTU	150	—	300, 420, 800	P G	0800 to 1000 1200 to 1400 2000 to 2400	0.60 ¹	—	—
60° 49' 07" N. 60° 43' 42" E.									
15° 58' 00" S. 5° 45' 00" W.	BXH	—	Government	—	P G	—	0.60	—	—
SAINT HELENA									
St. Helena									
SAINT LUCIA (See BRITISH WEST INDIES)									
SAINT PIERRE and MIQUELON ISLANDS									
Galantry ¹	FIT	300	Government	600	P G	0800 to 1900	0.40	—	¹ The station also com- municates with Miquelon ² This station only com- municates with Galantry
St. Pierre Is. 46° 46' 00" N. 56° 10' 00" W.									
Miquelon Is. 47° 07' 00" N. 56° 24' 00" W.	FIO	80	Government	600	—	0800 to 1100 1500 to 1700	—	—	
SALVADOR									
Las Lomas de Cande- laria	—	—	Government	—	—	—	—	—	¹ Meridian of Paris
13° 43' 47" N. ¹ 91° 21' 27" W.									
SAMOA ISLANDS									
Apia	VMG	Day 200 ³ 1,000 ⁴ Night 800 ⁵ 2,000 ⁶	—	300, 600, 2,000	P G ¹	N	0.60	—	¹ The station is con- nected to the interna- tional telegraph system by wireless through Awanui Radio, New Zealand (Normal route or Suva), Fiji Islands (alternative route) ² The station also com- municates with fixed sta- tions ³ On short waves ⁴ On long waves ⁵ Approximately
13° 51' 00" S. 171° 49' 52" W.									
Tutuila	NPU	250	U.S. Navy	300, 600	P G ¹	N	0.30	—	
11° 15' 00" S. ¹ 170° 45' 00" W.									
SANDWICH IS. (See HAWAIIAN ISLANDS)									

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
SANTO DOMINGO										
	Meridian of Greenwich.							Francs.	Francs.	
La Romana..	18° 25' 00" N. 68° 57' 20" W.	HTR	200-250	Guanica Centrale	300, 600, 1,600	P G ¹ ..	Local Time. 0800 to 1200 1400 to 1700	0.60 ² 0.30 ³	—	¹ La Romana and Santo Domingo also communicate with each other by wireless. Charge per word: fr. 0.40 without minimum. This charge is reduced to fr. 0.20 for telegrams sent on the service of the Santo Domingo Government
Santo Domingo ..	18° 25' 00" N. 69° 53' 21" W.	HIA	250	Government ..	300, 630, 1,600	P G ¹ ..	0800 to 1200 1400 to 1700.	0.60 ³ 0.30	—	² For ordinary radio-telegrams ³ For radiotelegrams sent on the service of the Santo Domingo Government
Santo Domingo City	18° 27' 43.51" N. ⁴ 69° 53' 13.44" W.	NJG	200	U.S. Navy ..	300, 600	P G ⁴ ..		0.30	—	⁴ Public correspondence is also exchanged with Guantanamo Bay (Cuba) ⁵ East Tower positions. West Tower positions as follows: 18° 27' 41.28" N. 69° 53' 18.09" W.
SARAWAK										
								—	—	¹ Communicates with Singapore
Blatulu ²	1° 33' 19" N. 110° 10' 50" E.	VQF	600	Government	600, 1,500, 1,800	P G ^{1,3} ..	0800 to 1130 1300 to 1730	0.60	3.00	² The station sends a time signal daily. (See International Time and weather Signals)
Kuching	4° 24' 25" N. 114° 00' 25" E.	VQP	400	Government ..	600, 1,500, 1,800	P G ..	0800 to 1130 1300 to 1730	0.60	3.00	³ Under construction
Miri ..	1° 07' 00" N. 110° 55' 00" E.	VQW	400	Government ..	600, 1,500, 1,800	P G ..	0800 to 1130 1300 to 1730	0.60	3.00	
Sadong ..	2° 16' 05" N. 111° 50' 15" E.	VQV	350	Government ..	600, 1,500, 1,800	P G ..	0800 to 1130 1300 to 1730	0.60	3.00	
Sibu ..										
SEYCHELLES										
Seychelles ..	Mahé 4° 00' 00" S. 55° 10' 00" E.	BZH	500	British Admiralty	600-2,000 (spark) 4,000 (arc)	P R ..	N	0.60	—	

STATION	Lat. Long.	Day	Night	Frequency	Power	Remarks
SIAM						
Bangkok	13° 43' 36.35" N. 100° 33' 02.08" E.	Day 300	Night 600	HGA	300, 600, 1,600, 1,800	— ¹
Singora (Songkhro)	Gulf of Siam, Malay Peninsula 7° 13' 05.11" N. 106° 32' 31.79" E.	Day 300	Night 600	HGB	300, 600, 1,600, 1,800	— ¹
SIERRA LEONE						
Sierra Leone	8° 30' 00" N. 13° 14' 00" W.	250		VPU	300, 600	P G ..
SINGAPORE (See MALAY PENINSULA)						
SOLOMON ISLANDS						
Kieta Radio	Bougainville Island 6° 12' 15" S. 150° 39' 36" E.	200		VIU	300, 600	P G ¹ ..
Tulagi	Florida Island 9° 05' 40" S. 160° 01' 40" E.	Day 400 Night 1,300		VQJ	600, 1,800, 2,300	P G ¹ ..
SOUTH AFRICA (Union of)						
Capetown	34° 08' 45.00" S. 18° 19' 17.51" E.	350		VNC	300, 600	P G ¹² ..
Durban	29° 49' 07" S. 31° 01' 17" E.	250		VND	300, 600	P G ¹ ..
Durban (Jacobs)	29° 50' 00" S. 30° 56' 00" E.	1,000		BZJ	600-2,000 (spark) 4,000 (arc)	O ..
Port Nolloth	29° 14' 00" S. 16° 52' 00" E.	1,000		BZJ	600-2,000 (spark) 4,000 (arc)	O ..

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range In Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
SPAIN	Meridian of Greenwich.							Francs.	Francs.	
Almeria ..	36° 51' 00" N. 2° 31' 15" W.	EGA	220	Army	600, 900	O ..	N	—	—	¹ Opened provisionally
Aranjuez ..	40° 01' 48" N. 3° 04' 32" W.	EAA	430	Compania Nacional de T.S.H.	300, 600, 2,130	P G ⁴ ..	N	0.45	4.50	² Under construction
Barcelona EAB	42° 18' 00" N. 1° 57' 20" E.	EAB	430	Compania Nacional de T.S.H.	300, 600, 2,300	P G ..	N	0.45	4.50	³ The station transmits only correspondence of the Compania Transatlantica
Barcelona EGE	41° 23' 08" N. 2° 03' 52" E.	EGE	430	Army	600, 1,000, 1,600	O ..	N	—	—	⁴ High-power interior station open for trans-continental public correspondence
Bilbao ..	43° 23' 53" N. 2° 55' 34" W.	EGH	320	Army	600, 1,200, 1,600	O ..	N	—	—	
Cabo de Palos	37° 37' 54" N. 0° 21' 22" W.	EAP	200	Compania Nacional de T.S.H.	300, 600, 1,800	P G ..	N	0.45	4.50	
Cabo Finisterre ¹	42° 53' 36" N. 9° 16' 10" W.	EAF	210	Compania Nacional de T.S.H.	300, 600, 1,800	P G ..	N	0.45	4.50	
Cabo Mayor	Santander 43° 20' 30" N. 3° 48' 28" E.	EAS	108	Compania Nacional de T.S.H.	300, 600, 1,800	P G ..	N	0.45	4.50	
Cadiz EAC	36° 31' 30" N. 6° 17' 42" W.	EAC	860	Compania Nacional de T.S.H.	300, 600, 2,540	P G ..	N	0.45	4.50	
Cadiz ..	36° 31' 30" N. 6° 17' 42" W.	—	6	—	70	P ³ ..	—	—	—	
Cartagena ..	37° 35' 36" N. 0° 59' 18" W.	EBX	210	Navy	600, 900, 1,000, 1,200, 1,600	O ..	N	—	—	
Coruña ..	43° 24' 29" N. 8° 24' 13" W.	EGJ	430	Army	600, 1,200, 1,600	O ..	N	—	—	
Guadalajara	40° 37' 54" N. 3° 10' 09" W.	EGZ	54	Army	900	O ..	X	—	—	
Huelva ..	—	—	—	Compania Nacional de T.S.H.	—	—	—	—	—	
La Carraca ..	Gulf of Cadiz 36° 29' 30" N. 6° 10' 50" W.	CLZ	60	Navy	300, 600, 1,200	O ..	N	—	—	
Le Ferrol ² ..	43° 28' 52" N. 8° 14' 05" W.	EBW	440	Navy	600, 900, 1,200, 1,600, 1,800	O ..	N	—	—	
Madrid EBZ..	40° 25' 00" N. 3° 43' 00" W.	EBZ	15	Navy	225, 300	O ..	N	—	—	

Station	Code	Altitude	Owner	Frequency	Power	Notes	Remarks
Madrid EGC	EGC	540	Army	..	600, 900, 1,600, 2,000, 2,500	N	
Mahon	EGI	320	Army	..	600, 1,200, 1,600	N	
Malaga	EGM	—	Compania Nacional de T.S.H.	—	70	—	
Matagorda	—	6	—	—	—	—	
San Fernando Cadiz	EBY	—	Compania Nacional de T.S.H.	—	—	N	
Soller	EAO	270	Compania Nacional de T.S.H.	PG	300, 600	N	4.50
Valencia	EGG	320	Army	..	600, 1,200, 1,600	N	—
Vigo	EAV	430	Compania Nacional de T.S.H.	PG	300, 600, 2,900	N	0.45
SPITZBERGEN							
Spitzbergen	LFG	400	Norwegian Government	PG	300, 600	N ¹	0.40
Calypso Bay	—	—	Northern Exploration Co.	P	600, 800, 1,000	—	—
STRAITS SETTLEMENTS (See MALAY PENINSULA)							
SUDAN							
Atbara	ATR	150	Sudan Government	PG	100	—	—
El Fasher	FSR	200	Sudan Government	PG	900	Week days: 0600 to 1300 Fridays and Holidays: 0900 to 1100 Do.	—
Kebekia	ZNR	200	Sudan Government	PG	900	Do.	—
Kereink	KER	200	Sudan Government	PG	900	Do.	—
Khartoum	KMR	250	Sudan Government	—	700	Do.	—
Khartoum *	SUK	1,500	Sudan Government	PG	1,000, 3,000 (C.W.)	—	—
Malakal..	MIR	250	Sudan Government	PG	700	Week days: 0600 to 1300 Fridays and Holidays: 0900 to 1100 Do.	—
Mongalla	MGR	250	Sudan Government	PG	700	Do.	—

¹ From June 13th to September 30th
² From October 1st to June 14th

¹ Approximately
² In the case of messages originating at or intended for Port Sudan, the local land line charge is included in the coast tax
³ Fitted with valve receiver
⁴ Projected, will not be completed before June, 1921

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
SUDAN—contd.										
Nasser	Meridian of Greenwich. 8° 35' 30" N. 33° 3' 30" E.	NSR	250	Sudan Govern- ment	700	P G ..	Week days : 0600 to 1300 Fridays and Holidays : 0900 to 1100 N	—	Franks.	
Port Sudan ..	19° 37' 05" N. 32° 12' 55" E.	SUD	250	Sudan Govern- ment	300, 600	P G ..	Week days : 0600 to 1300 Fridays and Holidays : 0900 to 1100 N	0.60 ²	—	
Wau	7° 41' 55" N. 28° 0' 30" E.	WWR	250	Sudan Govern- ment	700	P G ..		—	—	
SWAN ISLAND										
Swan Island ..	—	US	—	United Fruit Co. . .	—	—	—	—	—	¹ Acts as a relay station for Belize, British Honduras, for traffic intended for United States and United Kingdom
SWEDEN										
Boden	65° 50' 40" N. 21° 38' 50" E.	SAI	200	State Telegraphs	300, 600	P G ..	N ¹	0.30	3.00	¹ The station is closed, when by reason of ice, navigation is suspended in the Gulf of Bothnia
Gothenburg (Göteborg)	57° 30' 45" N. 11° 54' 15" E.	SAB	350	State Telegraphs	300, 600	P G ..	N ¹	0.30	3.00	² The station is intended for the transmission to the Karlskrona coast station of telegrams received by means of flag signals from ships passing within sight or the retransmission by means of these signals, to such ships, of telegrams sent to it through the Karlskrona coast station
Härnösand ..	62° 54' 15" N. 18° 07' 15" E.	SAH	350	State Telegraphs	300, 600	P G ..	N ¹	0.30	3.00	
Karlskrona ..	56° 07' 47" E. 15° 09' 09" N.	SAA	420	Marine Dept. . .	300, 600	P G ..	N	0.30	3.00	
Ölandsrev (Lightsip)	Near the extreme south of Öland 56° 07' 00" N. 16° 34' 00" E.	SAG	55	—	300, 450, 600	— ³	X	— ³	—	³ Telegrams originating and forwarded through the station
Tingstade ..	Gothland 57° 43' 30" N. 18° 35' 30" E.	SAE	420	Marine Dept. . .	300, 600	P G ..	N	0.30	3.00	
Trelleborg ..	56° 22' 13" N. 13° 09' 43" E.	SAC	250	State Railways . .	300, 375, 600	P R ⁴ , O ⁵	N	0.30	3.00	

Vaxholm	..	59° 21' 15" N. 18° 21' 50" E.	SAF	350	State Telegraphs	300, 600	P G	N	0.30	3.00	to the coast charge Karlakrona, the charge for transmission over the inland telegraph lines and a fixed charge of 1 fr. per radiotelegram Public correspondence with the ferry boats of the Sassnitz-Tralleborg Line Official correspondence with Sassnitz and with the ferry boats of the Sassnitz- Tralleborg Railway Line, concerning the railway traffic Meteorological infor- mation free on request.
TAHITI (See FRENCH OCEANIA)											
TJUBAGO (See BRITISH WEST INDIES)											
TONGA ISLANDS											
Nukualofa	Radio	21° 07' 57.5" S. 175° 12' 00" W.	VSB	520	Government	300, 600, 1200, 1600	P G ¹	1000 to 1500	0.60	—	
TOKIN (See FRENCH INDO-CHINA)											
TRINIDAD (See BRITISH WEST INDIES)											
TRIPOLI											
Tripoli	Radio	32° 34' 40" N. 13° 11' 40" E.	ICK	160	Government	300, 600	P G	N	0.30	—	
TUNIS											
Ben-Négo-Gonie	..	37° 15' 00" N. 9° 33' 30" E.	FUA ²	—	French Navy	450	D F	Central European Time. ¹ N	—	—	¹ One hour in advance of Greenwich time ² The coast charge is reduced to fr. 0.15 per word for correspondence with ships engaged in a regular service between France on the one hand, and Corsica, Algeria, and Tunis on the other ³ Works in connection with Bizerte.
Bizerte	..	In Sidi Abdallah 37° 16' 00" N. 9° 49' 00" E.	FUA	—	French Navy	—	O	0900 to 2400	—	—	
Cap-Bon	..	37° 04' 48" N. 11° 02' 23" E.	FFT	100	French Navy	300, 600	P G	0700 to 2200	0.40 ³	—	
TURKEY											
Constantinople (Ok Meidan)	..	41° 02' 00" N. 28° 38' 00" E.	—	—	—	600, 2,000	—	—	—	—	
UNITED KINGDOM											
Aberdeen	..	57° 08' 30" N. 2° 07' 00" W.	BYD	—	Admiralty	—	O	—	—	—	¹ Independent direc- tion finding station ² Special correspond- ence, including official and
Admiralty (See Whitehall)	..										

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED KINGDOM — <i>contd.</i>								Franks.	Franks.	ordinary telegrams exchanged with Rathlin Island
Air Ministry, London	Meridian of Greenwich. 51° 30' 40" N. 0° 07' 10" W.	GFA	500	Air Ministry	1400 (c.w.)	O ²	N	—	—	^a Peterhead, Berwick and Flamborough direction finding stations are linked together by special landline, enabling any one to control the other two if required
Amlwch, D F ¹²	53° 24' 28" N. 4° 16' 20" W.	BXV	—	Admiralty	450 (c.w.)	D F ¹	—	—	—	⁴ At the present the handling of public correspondence has been suspended
Andover, Hants	51° 12' 30" N. 1° 32' 30" W.	GFI	—	—	—	O	—	—	—	⁵ This coast tax applies to messages exchanged with all ships except those engaged on short voyages and where special arrangements have been made with the Postmaster-General for a reduced coast tax.
Baldonnel	53° 21' 00" N. 6° 29' 00" W.	GFB	—	—	—	O	—	—	—	(See notes 6 and 7.) In the case of telegrams originating in or intended for the United Kingdom the combined coast and land line charge is fr. 0.73 per word
Ballybunion Ballycastle Rad	Ireland, Co. Kerry Channel 55° 11' 00" N. 6° 12' 00" W.	YXQ GSL	15	Post Office	250	P	0845 to 2025	—	—	⁶ This coast tax applies to messages exchanged with certain vessels making regular voyages of more than 200 miles, but not exceeding 1,000 miles and where special arrangements have been made with the Postmaster-General for the application of such tax. In the case of radiotelegrams originating in or intended for the United Kingdom, the
Berwick, D F ¹²	55° 41' 48" N. 5° 53' 40" W.	BVG	—	Admiralty	450	D F ¹	—	—	—	
Broomfield, Essex	51° 53' 00" N. 0° 28' 00" E.	MAX	—	Marconi Co.	—	— ²²	—	—	—	
Bunbeg	North-west coast of Ireland 55° 04' 00" N. 8° 09' 00" W.	BYR	—	Admiralty	600, 800	O ²²	—	—	—	
Butt of Lewis	58° 32' 00" N. Near Yarmouth	—	—	Lloyd's	—	P	—	—	—	
Caister-on-Sea Rad	52° 38' 40" N. 1° 43' 52" E.	GCS	—	Post Office	1,000	— ²²	—	—	—	
Carnarvon Rad	53° 07' 25" N. 5° 11' 32" W.	MUU	—	Marconi Co.	14,500	— ²²	N	—	—	
Carnore, D F ¹	53° 11' 30" N. 6° 21' 00" W.	BVZ	—	Admiralty	450	D F ¹	—	—	—	
Castle Bromwich Rad	52° 30' 00" N. 1° 50' 00" W.	GEC	400	Civil Aviation	900 (c.w.)	—	Sunrise to sunset	—	—	
Cattewater	50° 25' 00" N. 4° 05' 00" W.	GFM	—	—	—	O	—	—	—	
Chelmsford	51° 43' 45" N. 0° 28' 38" E.	MZX	—	Marconi Co.	—	— ²²	—	—	—	
Cleethorpes	South-east of Grimsby 53° 31' 00" N. 0° 02' 00" W.	BYB	—	Admiralty	3,000	O	—	—	—	

Clifden Rad	..	West Coast of Ireland	MFT	—	Marconi Co.	..	6,500	—	—	—	—	combined coast and land line charge is fr. 0.44 per word, with a minimum of fr. 4.40 per radiotelegram
Corkbeg	..	Entrance to the Port of Cork	BYQ	—	Admiralty	..	800, 800	0	..	—	—	⁷ This coast tax applies to messages exchanged with certain ships making regular voyages of 200 miles or less and where special arrangements have been made with the Postmaster-General for the application of such tax.
Cranwell	..	5° 49' 00" N. 5° 15' 00" W.	GFC	—	—	..	(c.w.)	0	..	—	—	In the case of messages originating in or intended for the United Kingdom, the combined coast and land line charge is fr. 0.28 per word, with a minimum of fr. 2.80 per radiotelegram
Cromarty	..	Black Isle	BYP	—	Admiralty	..	—	0	..	—	—	⁸ Reception and transmission of distress signals
Crookhaven	..	57° 41' 45" N. 4° 01' 30" W.	GXO	250	Post Office	..	300	—	—	—	—	⁹ A fixed charge is made of fr. 1 per radiotelegram in addition to the ordinary telegraph charges
Cross Sand Lightship	..	South Coast of Ireland	GVA	15	Trinity House	..	230	—	—	—	—	¹⁰ Correspondence restricted to messages exchanged with the steamers of the South Eastern and Chatham Railway Company
Croydon Rad	..	North-east of Yarmouth	GED	400	Civil Aviation	..	900	—	—	—	—	¹¹ Correspondence restricted to ships of the Midland Railway Company
Cullercoats Rad	..	5° 26' 48" N. 10° 01' 00" W.	GCC	250	Post Office	..	300, 800	P G	..	0.60 ⁹ 0.33 ⁹ 0.17 ⁹	—	¹² During the passage of the steamers between Heysham and Belfast
Culver Cliff	..	5° 07' 30" N. 9° 07' 00" W.	BYM	200	Admiralty	..	220, 600, 800, 1,000	0	..	—	—	¹³ The wavelength of 600 metres is used solely for communication with Scheveningen-Port. Such communication takes place only in the case of urgent need
Didsbury, Lanes.	..	5° 02' 15" N. 5° 25' 46" W.	GEM	400	Civil Aviation	..	900	—	—	—	—	¹⁴ Communication restricted to the ships of the Great Eastern Railway Company
Dover	..	Isle of Wight	BYL	—	Admiralty	..	—	0	..	—	—	¹⁵ During the passage of the steamers
East Goodwin Lightship	..	50° 40' 00" N. 1° 06' 00" W.	GVB	15	Trinity House	..	230	—	—	—	—	¹⁶ Correspondence restricted to ships of the Midland Railway Company
Fastnet	..	5° 13' 00" N. 5° 36' 00" E.	GNJ	100	Lloyd's	..	300	P	..	—	—	¹⁷ The wavelength of 600 metres is used solely for communication with Scheveningen-Port. Such communication takes place only in the case of urgent need
Felixstowe	..	5° 23' 00" N. 0° 36' 00" W.	BYJ	—	Admiralty	..	—	0	..	—	—	¹⁸ Communication restricted to the ships of the Great Eastern Railway Company
Felixstowe	..	Near Harwich	GFF	—	—	..	(c.w.)	0	..	—	—	¹⁹ During the passage of the steamers
Fishguard Rad	..	5° 57' 00" N. 1° 20' 00" E.	GRL	200	Post Office	..	300, 800	P G	..	0.60 ⁹ 0.33 ⁹ 0.17 ⁹	—	²⁰ Correspondence restricted to ships at sea when out of range of any
Flamborough DF ¹⁸	..	Pembrokeshire	BVN	—	Admiralty	..	450	DF	..	—	—	
Flannan Islands	..	52° 00' 53" N. 4° 59' 00" W.	—	—	Lloyd's	..	—	P	..	—	—	
Folkestone Harbour Rad	..	54° 07' 05" N. 0° 04' 58" W.	GUR	45	South Eastern and Chatham Rail-way	..	300, 600	P	..	—	—	
Grimsby Rad	..	58° 17' 00" N. 7° 33' 00" W.	BYV	100	Post Office	..	300, 800	P G	..	0.60 ⁹ 0.33 ⁹ 0.17 ⁹	—	
	..	51° 04' 30" N. 1° 11' 30" E.										
	..	53° 35' 10" N. 0° 04' 10" W.										

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED KINGDOM —contd.										
Guernsey Rad	Channel Islands 49° 27' 10" N. 2° 31' 50" W.	GKA	—	Post Office	—	— ³⁰	—	—	Francs.	other British coast station; weather report transmitted at 0930 and 2130
Gull Lightship	53° 16' 00" N. 5° 28' 00" E.	GVC	15	Trinity House	230	— ³	N	—	—	³¹ Special correspondence, including official and ordinary telegrams exchanged with Ballycastle, Antrim
Harwich BVH	51° 57' 00" N. 1° 15' 00" E.	BVH	—	Admiralty	—	O ..	—	—	—	³² Dependent direction finding station controlled by Amlwch
Harwich BWH	51° 57' 00" N. 1° 15' 00" E.	BWH	—	Admiralty	—	O ..	—	—	—	³³ Dependent direction finding station controlled by Malin Head
Hevesham Harbour Rad	Morecambe Bay 54° 02' 00" N. 3° 05' 00" E.	GKG	150	Midland Railway	400	P ¹¹ ..	N ¹²	—	—	³⁴ Transmitting station for Seaview direction finding station
Horsea	Near Portsmouth 50° 50' 30" N. 1° 06' 00" W.	BYC	—	Admiralty	3,000, 4,500	O ..	—	—	—	³⁵ Transmitting station for Rhyl direction finding station
Howden	53° 47' 00" N. 0° 53' 00" W.	GFZ	—	—	(c.w.)	O ..	—	—	—	³⁶ Special correspondence, including official and ordinary correspondence exchanged with Lough-boisale
Inningham	53° 37' 00" N. 0° 11' 00" W.	BZU	—	Admiralty	—	O ..	—	—	—	³⁷ Experimental station
Inchkeith	Firth of Forth 56° 02' 00" N. 3° 09' 00" W.	BZA	—	Admiralty	600	O ..	—	—	—	³⁸ Trans-ocean service
Inishtrahull Rad	55° 25' 00" N. 7° 13' 00" W.	GQM	100	Lloyd's	300	P ³⁶ ..	—	—	—	³⁹ Trans Atlantic service communicates with Glace Bay (Nova Scotia)
Ipswich	52° 03' 00" N. 5° 09' 00" E.	BYE	—	Admiralty	—	O ..	—	—	—	⁴⁰ For signal duty
Isle of Man Rad	54° 09' 00" N. 4° 30' 00" W.	GDX	—	—	—	—	—	—	—	⁴¹ Trans-Atlantic receiving station only
Kingsnorth	51° 25' 00" N. 0° 36' 00" E.	BZS	—	Admiralty	—	O ..	—	—	—	⁴² Trans-ocean receiving station
Kingstown	53° 17' 00" N. 6° 08' 00" W.	BWK	—	Admiralty	—	O ..	—	—	—	⁴³ Communicates only with fixed stations
Land's End Rad	West Coast of Cornwall 50° 07' 03" N. 5° 40' 10" W.	GLD	250	Post Office	300, 800	P G ..	N	0.60 ³ 0.33 ⁴ 0.17 ⁷	— 3.30 ⁶ 1.70 ⁷	⁴⁴ Station temporarily closed
Larne, DF ¹ ..	54° 51' 15" N. 5° 48' 15" W.	BXI	—	Admiralty	450	DF ¹ ..	—	—	—	⁴⁵ Station used only in emergency
										⁴⁶ The station broadcasts synoptic reports at

0315, 0845 and 2015 hours. Meteorological reports at 35 minutes past each hour from 0735 to 1635 inclusive, and general forecasts at 0915 and 2000 hours ²² Under construction

[illegible]

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED KINGDOM <i>contd.</i>										
Rame Head ..	Meridian of Greenwich. Entrance to the port of Plymouth 50° 19' 00" N. 50° 13' 00" W.	BYO	—	Admiralty ..	600, 800	O ..	—	—	—	Frans.
Rathlin Island Rad	North Channel 56° 17' 00" N. 56° 10' 00" W.	GRN	15	Post Office ..	250	— ¹¹	0825 to 2025	—	—	—
Renfrew Rad	55° 51' 00" N. 4° 23' 36" W.	GER	400	Civil Aviation ..	900 (c.w.)	—	From sunrise to sunset	—	—	—
Rhyl DF ¹⁸ ..	53° 18' 20" N. 3° 28' 50" W.	BZW	—	Admiralty ..	450	D F ¹⁸ ..	—	—	—	—
Rosyth ..	West of Edinburgh 56° 01' 00" N. 3° 23' 00" W.	BYH	—	Admiralty ..	—	O ..	—	—	—	—
Scarborough Rad	54° 16' 00" N. 0° 26' 00" W.	BYI	—	Admiralty ..	—	O ..	—	—	—	—
Seaforth Rad	Liverpool 53° 28' 14" N. 3° 00' 42" W.	GLV	150	Post Office ..	300, 600	P G ..	N	0.60 ⁸ 0.33 ⁸ 0.17 ¹	—	—
Seaview DF ¹⁸ ..	55° 22' 00" N. 5° 10' 24" W.	BXK	—	Admiralty ..	450	D F ¹⁸ ..	—	—	—	—
Sheerness ..	Mouth of the Thames 51° 27' 00" N. 0° 45' 00" E.	BYK	—	Admiralty ..	—	O ..	—	—	—	—
Shotwick ..	53° 14' 00" N. 2° 59' 00" W.	GFO	—	—	(c.w.)	O ..	—	—	—	—
South Goodwin Light-ship	Straits of Dover 51° 09' 00" N. 1° 28' 00" E.	GVD	15	Trinity House ..	230	— ⁸	N	—	—	—
Stockton ..	Near Middlesbrough 54° 34' 00" N. 1° 21' 00" W.	BYT	—	Admiralty ..	—	O ⁸ ..	—	—	—	—
Stonehaven Rad	South of Aberdeen 56° 56' 21" N. 5° 17' 00" W.	GSW	9 ⁷⁰ 450	Post Office ..	300, 600, 1,800, 5,000	O ..	—	—	—	—

	South-east of Harwich 5° 51' 00" N. 1° 30' 00" E. Isle of Mull 56° 37' 10" N. 6° 03' 30" W. North of Margate 51° 30' 00" N. 1° 23' 00" E.	GVE	30	Trinity House	230		0800 to 2000			
Sunk Lightship				Trinity House	230					
Tobermory Rad		GCA	150	Post Office	300			0800 to 2000		
Tongue Lightship		GVE	15	Trinity House	230			N		
Towyn		MUV	—	Marconi Co.	—			—		
Tynemouth		BZT	—	Admiralty	—			O		
Valentia Rad		GCK	250	Post Office	300, 600			P G		0.60 ⁶ 0.30 ⁶ 0.17 ⁷
Whitehall, London		BYA	—	Admiralty	—			O		—
Wick Rad		GKR	—	Post Office	300, 600			P G		0.60 ⁶ 0.33 ⁶ 0.17 ⁷
UNITED STATES OF AMERICA										
Akron, Ohio		WOI	350	Goodyear Tire and Rubber Co.	300, 600, 2,000 ⁸			P		—
Alpena		NSM	150	U.S. Navy	300, 600			P G		0.30
Anacostia NOF, District of Columbia ¹		NOF	—	U.S. Navy	—			O		—
Anacostia District of Columbia ²		NSF	100	U.S. Navy	300, 600			P G ³		0.30
Anastasia Isle, Florida		NAP	—	U.S. Navy	300, 600			P G		0.30
Anderson, Virginia		WZM	—	U.S. Army	—			O		—
Annapolis, Maryland		NSS	4,000	U.S. Navy	300, 600			O		—
NSS		NAK	—	U.S. Navy	300, 600			P G		0.30
Annapolis, Maryland		NTW	100	U.S. Navy	600			D F		—
NAK		NQB	150	U.S. Navy	300, 600			P G		0.30
Appledore Island		NUZ	1,000	U.S. Navy	300, 600			P G		0.30
Ashtabula										
Astoria, Oregon										

¹ Instructional and experimental
² Communicates only with aeroplanes
³ Mean time of meridian 90° W. of Greenwich
⁴ For communication with Koko Head, NPM (Hawaiian Islands)
⁵ Approximately Great Lakes Naval training station
⁶ Mean time of the meridian 120° W. of Greenwich
⁷ Trans-ocean Station only with Oakland, California
⁸ Communicates only with Canton, Ohio
⁹ For radiotelegrams exchanged with ships plying within 200 miles of New York (N.Y.)
¹⁰ For other radio telegrams

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.										
Avalon, California ..	Meridian of Greenwich. S. Catalina Island 33° 21' 00" N. 118° 20' 00" W.	NZL	150	U.S. Navy ..	300, 600	P G ..	N	Francs. 0.30	Francs.	¹² No charge is made for relaying messages ¹⁴ For radiotelegrams exchanged with coastwise ships ¹⁵ For radiotelegrams exchanged with trans-oceanic ships ¹⁶ Radio time signals are sent out daily from 2155 to 2200 ¹⁷ Time signals are sent daily from 1155 to 1200 (standard time of the meridian 120° W. of Greenwich) on the wavelengths of 4,800 metres (arc) and 2,400 metres (spark) ¹⁸ Time signals are sent daily from 1155 to 1200 and 2155 to 2200 (standard time of the meridian 75° W. of Greenwich) on the wavelength of 2,500 metres
Avalon, California KUXV	36° 17' 22" N. 76° 36' 41" W.	KUXV	—	—	—	—	—	—	—	
Baltimore, Maryland	44° 18' 36" N. 68° 11' 27" W.	NBZ	140	U.S. Navy ..	300, 600	P G ..	N	0.30	—	
Bar Harbour ..	44° 18' 36" N. 68° 11' 27" W.	NBD	200	U.S. Navy ..	300, 600	P G & D F	N	0.30	—	
Baseline Ranger Station, Arizona	Apache Nat. Forest 33° 22' 01" N. ^s 109° 10' 49" W.	NZT	30	Dept. of Agriculture	550, 580, 800 . O	O ..	1900 to 2230	—	—	
Peaufort, North Carolina	34° 43' 12" N. 76° 39' 00" W.	NAN	100	U.S. Navy ..	300, 600	P G ..	N	0.30	—	
Bellefonte, Pennsylvania	42° 06' 42" N. 80° 28' 21" W.	WWQ	—	Post Office Dept. of America	—	— ^s	—	—	—	
Belmar ..	New Jersey 42° 06' 42" N. 80° 28' 21" W.	WII	—	Radio Corpn. of America	—	—	N	—	—	
Benton Harbour ..	38° 32' 45" N. 75° 03' 20" W.	NUF	150	U.S. Navy ..	300, 600	P G ..	N	0.30	—	
Bethany Beach, Delaware	38° 32' 45" N. 75° 03' 20" W.	NSD	125	U.S. Navy ..	300, 600	D F ..	N	—	—	
Binghamton ..	New York 42° 08' 00" N. 75° 55' 00" W.	WBT	150	Delaware, Lackawanna & Western Railroad Co.	1,610	—	X	—	—	
Bird Island, California	—	NLD	—	U.S. Navy ..	800	D F ..	—	—	—	
Bolinas, California ..	37° 54' 48" N. 122° 43' 33" W.	NZP	3,500	Radio Corpn. of America	—	— ^s	N	—	—	
Bolinas ..	—	KET	—	Radio Corpn. of America	6,700	P R ..	N	—	—	
Boston ..	Massachusetts 42° 22' 10" N. 71° 03' 40" W. ^s	NAD	150	U.S. Navy ..	300, 600	P G	N	0.30	—	
Boston, WBF	—	WBF	—	—	300, 600	P G	N	0.60	—	

Brenton Reef Light Vessel (No. 39)	41° 25' 00" N. 71° 22' 00" W.	NAH	—	U.S. Navy	600	P G	N	—	—
Brooklyn, New York	40° 48' 00" N. 73° 50' 00" W.	WCG	—	U.S. Navy	300, 800	P G	N	—	0.30
Brooklyn, New York, WCG	—	WUZ	250	International Radio Tel. Co.	300, 800	P R	N	—	0.15 ¹¹ 18 0.30 ¹¹ 18
Brownsville, Texas	—	WUZ	250	U.S. Army	1,000	O	X	—	—
Brunswick, Georgia	—	NOS	150	U.S. Navy	300, 800	—	N	—	0.30
Buckroe	Virginia, Fort Monroe	WZL	—	U.S. Army	—	O	—	—	—
Buffalo, New York	42° 52' 40" N. 78° 52' 36" W.	NNZ	150	U.S. Navy	300, 800	P G	N	—	0.30
Bull Island, South Carolina	—	NZY	—	U.S. Navy	800	D F	—	—	—
Burwood, Louisiana NBX	28° 48' 04" N. 89° 22' 45" W.	NBX	150	U.S. Navy	300, 800	D F	N	—	—
Burwood, Louisiana WBW	—	WBW	—	Tropical Radio Tel. Co.	300, 800	P G	X	—	—
Butte, Montana	—	KMN	—	Great Falls Power Co.	550, 1,700	P R	X	—	—
Calumet, Michigan	42° 15' 12" N. 86° 27' 12" W.	NUG	150	U.S. Navy	300, 800	P G	N	—	0.30
Canton, Ohio	40° 48' 00" N. 81° 22' 00" W.	WQP	100	Henry L. Ley	500	—	X	—	—
Camp Vail, New Jersey WEBB	—	WEBB	—	U.S. Army Sigs...	—	—	—	—	—
Camp Vail, New Jersey WEBC	—	WEBC	—	U.S. Army Sigs...	—	—	—	—	—
Camp Vail, New Jersey WEBD	—	WEBD	—	U.S. Army Sigs...	—	—	—	—	—
Camp Vail, New Jersey WEBF	—	WEBF	—	U.S. Army Sigs.	—	—	—	—	—
Camp Vail, New Jersey WEBG	—	WEBG	—	U.S. Army Sigs...	—	—	—	—	—
Cape Cod	Massachusetts 42° 02' 58" N. 70° 04' 32" W.	NAE	1,000	U.S. Navy	300, 600	P G, D F	N	—	0.30
Cape Fear	North Carolina	NDK	—	U.S. Navy	800	D F	—	—	—
Cape Hatteras	Buxton N.C. 35° 15' 58" N. 75° 31' 21" W.	NDW	150	U.S. Navy	300, 600	P G, D F	N	—	0.30
Cape Henlopen, Delaware	38° 47' 26" N. 75° 05' 16" W.	NSD	100	U.S. Navy	300, 600	D F	N	—	—
Cape Henry	36° 55' 16" N. 75° 50' 51" W.	NCZ	100	U.S. Navy	300, 600	D F	N	—	—
Cape Lookout, North Carolina	34° 36' 13" N. 78° 32' 15" W.	NAN	100	U.S. Navy	800	D F	N	—	—
Cape May	New Jersey 38° 50' 50" N. 74° 55' 46" W.	NSD	200	U.S. Navy	300, 600	P G, D F	N	—	0.30

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.										
Meridian of Greenwich.										
Carney's Point ..	New Jersey 39° 43' 00" N. 75° 27' 00" W.	WPO	100	E. I. du Pont de Nemours & Co.	300, 425, 000	P ..	X	—	—	Franks. Franks.
Catt's Point, Washington	—	NFN	—	U.S. Navy	800	DF ..	—	—	—	—
Charleston, South Carolina	32° 51' 28" N. 79° 57' 42" W.	NAO	150	U.S. Navy	300, 600	P G, D F	N	0.30	—	—
Chatham WSO	Massachusetts 41° 40' 00" N. 69° 51' 00" W.	WSO	—	Radio Corp. of America	—	—	—	—	—	—
Chatham NXA *	—	NXA	—	U.S. Navy	300, 600	P G ^a	N	0.30	—	—
Cheboygan ..	Illinois 41° 52' 30" N. 87° 37' 30" W.	KUXM	—	—	300, 450, 600	P R ..	X	—	—	—
Chicago NUR	—	NUR	150	U.S. Navy	300, 600	P G	N	0.3c	—	—
Chicago WGO	—	WGO	—	—	300, 600, 2,000	P R ..	0830 to 1700	—	—	—
Chicago WWG	Illinois	WWG	—	—	—	—	—	—	—	—
Cleveland, Ohio ..	41° 29' 59" N. 81° 31' 13" W.	NRH	150	U.S. Navy	300, 600	P G ..	N	0.3c	—	—
Cleveland, Ohio WCX	—	WCX	—	Inter-City Radio Co.	—	P R ..	—	—	—	—
Conneaut Harbour ..	Lake Erie 41° 57' 00" N. 80° 36' 00" W.	WEV	220	Marquette Besemer Dock and Navigation Co.	300, 475, 540, 600	P R ..	X	0.15	—	—
Craftonville ..	California 34° 05' 10" N. 117° 02' 30" W.	KJQ	250	Southern California Edison Co.	1,610	P	X	—	—	—
Cross Island, Maine..	44° 36' 22" N. 67° 16' 49" W.	NFL	100	U.S. Navy	300, 600	D F ..	N	—	—	—
Dallas, Texas	—	KUXP	—	—	300, 485, 600, 1,650	P R ..	N	0.15	1.50	—
Damiscove Island, Maine *	43° 45' 17" N. 69° 36' 47" W.	NFQ	100	U.S. Navy	300, 600	D F ..	N	—	—	—
Deer Island, Massachusetts	42° 31' 15" N. 70° 57' 20" W.	NAD	100	U.S. Navy	300, 600	D F ..	N	—	—	—
D. L. & W. R. R. Limited Train	—	—	—	Delaware, Lackawanna & Western Railroad Co.	—	—	—	—	—	—
Denver, Colorado ..	39° 45' 00" N. 105° 00' 00" W.	KIX	100	William H. Smith	300, 575	P ..	X	—	—	—

Detroit, Michigan	42° 20' 00" N. 83° 16' 00" W.	NRQ	300	U.S. Navy	300, 600	PG	N	0.30
Detroit, Michigan	—	WDR	—	Inter-City Co.	—	PR	—	—
Detroit, Michigan	42° 20' 00" N. 83° 16' 00" W.	WOK	300	Goodyear Tire and Rubber Co.	300, 600, 2,160	P	0830 to 1630 ^a	—
Douglas, Arizona	31° 20' 41" N. 109° 22' 24" W.	KDC	100	The Copper Queen Consolidated Mining Co.	600, 1,650	P	1000 to 1100 ⁷ 1600 to 1700	—
Dry Tortugas, Florida	—	NYZ	—	U.S. Navy	300, 600	PG	N	0.30
Duluth, Minnesota	46° 47' 06" N. 92° 06' 10" W.	NUX	250	U.S. Navy	300, 600	PG	N	0.30
East San Pedro, California	33° 44' 00" N. ^a 118° 17' 00" W.	NPX	200	U.S. Navy	300, 600	PG	N	0.30
Ecorse, Michigan	42° 15' 17" N. 83° 07' 15" W.	NDL	150	U.S. Navy	300, 600	PG	N	0.30
Eureka, California	40° 41' 44" N. 124° 16' 22" W.	NPW	240	U.S. Navy	300, 600	PG	N	0.30
Fairpoint, Virginia	—	KDAH	—	—	—	—	—	—
Farallons, California	37° 41' 58" N. 123° 41' 58" W.	NPI	150	U.S. Navy	300, 600	—	N	0.30
Fire Island	New York State, south coast of Long Island	NAG	150	U.S. Navy	300, 600	PG & DF	N	0.30
Fisherman's Island, Virginia	40° 37' 57" N. 73° 12' 08" W.	NBF	150	U.S. Navy	300, 600	— ^a	N	—
Fort Adams	37° 06' 00" N. 73° 59' 00" W.	WUU	125	U.S. Army	1,100, 1,200	O	X	—
Fort Andrews	Rhode Island Massachusetts	WUA	—	U.S. Army	1,100	O	X	—
Fort Barrancas, Florida	42° 08' 04" N. 70° 55' 44" W.	WZD	100	U.S. Army	600, 800, 1,000, 1,150, 1,230	O	X	—
Fort Bliss	30° 20' 43" N. 87° 18' 05" W.	WZO	2,000	U.S. Army	3,100, 6,000, 7,000, 8,000, 10,000	O	N	—
Fort Brown, Texas	31° 45' 00" N. 106° 00' 00" W.	WUZ	250	U.S. Army	1,350—7,000	O	N	—
Fort Casey, Washington	48° 00' 00" W. Puget Sound	WZJ	50	U.S. Army	500	O	X	—
Fort Caswell, North Carolina	—	WUT	30	U.S. Army	825	O	X	—
Fort Constitution, New Hampshire	43° 04' 16" N. 70° 42' 40" W.	WZE	25	U.S. Army	300, 600	O	0800 to 1700	—
Fort Crockett, Texas	29° 46' 28" N. 99° 18' 52" W.	WUX	30	U.S. Army	600, 900	O	X	—
Fort Dade, Florida	94° 48' 52" N. 87° 35' 41" W.	WZK	25	U.S. Army	825	O	X	—
Fort Du Pont	82° 45' 45" W. Delaware	WZN	35	U.S. Army	825	O	X	—
Fort Hancock, New Jersey	39° 34' 10" N. 75° 35' 20" W. 40° 37' 57" N. 73° 13' 08" W.	WUB	—	U.S. Army	1,200	O	X	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.										
Fort H. G. Wright ..	Meridian of Greenwich. New York State 41° 15' 20" N. 72° 01' 12" W.	WUC	150	U.S. Army	600	O	X	—	—	
Fort Howard, Maryland	—	WZB	125	U.S. Army	600, 825, 1,200	O	X	—	—	
Fort Huachuca	Arizona	WZP	—	U.S. Army	2,300, 2,750	O	N	—	—	
Fort Leavenworth ..	Kansas 39° 21' 00" N. 94° 55' 31" W.	WUD	180	U.S. Army	1,800	O	X	—	—	
Fort Levett, Maine	43° 38' 40" N. 73° 11' 39" W.	WUE	—	U.S. Army	300—1,300	O	X	—	—	
Fort McIntosh ..	Laredo, Texas 27° 30' 29" N. 99° 31' 02" W.	WUH	1,000	U.S. Army	1,350—3,050	O	N	—	—	
Fort Monroe	Virginia 37° 00' 06" N. 76° 18' 2" W.	WUF	150	U.S. Army	400, 600, 825, 1,100	O	X	—	—	
Fort Morgan, Alabama	30° 13' 42" N. 88° 01' 23" W.	NHB	150	U.S. Navy	300, 600	P G	N	0.30	—	
Fort Morgan, Alabama	Mobile Bay	WUR	50	U.S. Army	600, 1,200	O	X	—	—	
Fort Moultrie, South Carolina	—	WZF	50	U.S. Army	600, 825	O	X	—	—	
Fort Riley, Kansas	39° 04' 35" N. 96° 47' 01" W.	WUI	180	U.S. Army	1,200	O	X	—	—	
Fort Rosecrans ..	California	WUS	50	U.S. Army	300, 575	O	X	—	—	
Fort Sam Houston ..	Texas 26° 26' 39" N. 98° 27' 44" W.	WUJ	1,500	U.S. Army	3,100—9,500	O	N	—	—	
Fort San Jacinto, Texas	20° 19' 49" N. 94° 45' 28" W.	WUY	30	U.S. Army	300, 1,200	O	X	—	—	
Fort St. Philip, Louisiana	30° 45' 00" N. 90° 35' 06" W.	WXQ	30	U.S. Army	450, 600, 1,100	O	0800 to 1145 1300 to 1700	—	—	
Fort Screven, Georgia	32° 06' 34" N. 80° 50' 37" W.	WZA	40	U.S. Army	825	O	X	—	—	
Fort Stevens	Oregon Mouth Columbia River	WUK	125	U.S. Army	1,100	O	X	—	—	
Fort Stevens NPE ..	Oregon	NPE	—	—	—	—	—	—	—	

Fort Stevens Fort Story, Virginia	30° 55' 22" N. 75° 39' 58" W.	NZS WXZ	— 200	U.S. Navy U.S. Army	360, 555, 825, 1,100	O	0800 to 1630 except Saturday afternoon and Sunday	—
Fort Totten, New York	40° 47' 38" N. 73° 47' 00" W.	WUL	600	U.S. Army	600, 800, 1,100, 1,200	O	N	—
Fort Travis, Texas	29° 21' 51" N. 94° 45' 31" W.	WXP	30	U.S. Army	600, 900	O	X	—
Fort Washington, Maryland	39° 00' 00" N. 77° 00' 00" W.	WYX	25	U.S. Army	825, 1,200	O	X	—
Fort Whitman, Washington	—	WZC	125	U.S. Army	400, 1,100	O	X	—
Fort Winfield Scott	California 37° 47' 36" N. 122° 28' 30" W.	WUO	250	U.S. Army	1,100	O	X	—
Fort Wood	New York 42° 09' 40" N. 70° 42' 22" W.	WUM	—	U.S. Army	1,100	O	X	—
Fort Worden	Washington 44° 37' 46" N. 86° 14' 17" W.	WUN	125	U.S. Army	1,200	O	X	—
Fourth Cliff, Massachusetts	—	NAD	100	U.S. Navy	300, 600	D F	N	—
Frankfort, Michigan	43° 03' 17" N. 86° 14' 17" W.	NSR	150	U.S. Navy	300, 600	P G	N	0.30
Galveston	Texas 29° 58' 54" N. 94° 16' 52" W.	NKB	150	U.S. Navy	300, 600	P G	N	0.30
Gloucester, Massachusetts	42° 35' 19" N. 70° 41' 08" W.	NAD	150	U.S. Navy	300, 600	D F	N	—
Grand Haven	Michigan 43° 03' 17" N. 86° 14' 17" W.	NSY	150	U.S. Navy	300, 600	P G	N	0.30
Grand Island, Michigan	—	NSY	—	U.S. Navy	—	—	—	—
Great Falls, Montana	—	KLQ	—	Great Falls Power Co.	550, 1,700	P R	X	—
Great Lakes	Illinois 42° 18' 30" N. 87° 50' 00" W.	NAJ	250	U.S. Navy	300, 600	P G	N	0.30
Hampton Roads	Virginia 37° 00' 00" N. 76° 58' 00" W.	NAM	100	U.S. Navy	300, 600	—	N	—
Hillcrest, California	37° 48' 00" N. 122° 30' 00" W.	NWO	250	U.S. Navy	300, 600	P G	N	0.30
Hog Island, Penn. Hog Island, Virginia	37° 22' 36" N. 75° 42' 37" W.	KDAB NCZ	— 100	— U.S. Navy	— 300, 600	P D F	X N	—
Hoboken, New Jersey	40° 43' 00" N. 74° 02' 00" W.	WBU	400	Radio Corp. of America	2,240	P	X	—
Hollister, California	36° 55' 43" N. 121° 24' 00" W.	KGH	200	Palmer B. Hewlett	300, 600, 1,650	—	—	—
Independence, Kansas	37° 14' 00" N. 95° 44' 00" W.	WQL	150	Kansas Gas & Electric Co.	1,700	P	—	—
Indian Head, Maryland	38° 38' 00" N. 77° 10' 55" W.	NBG	50	U.S. Navy	300, 600	O	X	—
Inglewood, California	34° 03' 05" N. 118° 14' 32" W.	NWR	850	U.S. Navy	300, 600	P G	N	0.30

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.	Meridian of Greenwich.									
Jacksonville, Florida	30° 19' 25" N; 81° 38' 56" W.	NFI	150	U.S. Navy	300, 600	P G	N	0.30	—	Francs.
Johnswood, Michigan	—	KUVQ	—	—	300, 450, 600	P R	X	—	—	—
Jordan, Montana	—	KUVR	—	Miles City— Jordan Wireless Co.	500	P R	0800 to 1800	—	—	—
Jupiter	Florida N. 26° 56' 54" N. 80° 04' 48" W.	NAQ	250	U.S. Navy	300, 600	P G	N	0.30	—	—
Keyport, Washington	47° 37' 18" N. 122° 37' 08" W.	NPZ	250	U.S. Navy	300, 600	P G	N	0.30	—	—
Key West, Florida	24° 32' 48" N. 81° 30' 52" W.	NAR	250	U.S. Navy	300, 600	P G	N	0.30	—	—
Leuto	81° 30' 52" W. Oregon	KFU	—	Federal Telegraph Company	—	—	—	—	—	—
Lewistown, Montana	45° 23' 00" N. 122° 35' 00" W.	KLP	150	Montana Power Co.	300, 600, 1,600	P	X	—	—	—
Light Vessel No. 1	Maritime Industry, S.C. 32° 06' 12" N. 80° 28' 00" W.	NART	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 3	Handkerchief, Mass. 41° 29' 00" N. 70° 04' 00" W.	NAQS	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 5	Stone Horse Shoal, Mass. 41° 32' 00" N. 66° 50' 00" W.	NANT	1,000	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 9	Hedge Fence, Mass. 41° 28' 19" N. 70° 39' 03" W.	NATD	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 11	Scotland, N.Y. 46° 26' 00" N. 73° 55' 00" W.	NARV	125	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 20	Cross Rip, Mass. 41° 26' 50" N. 70° 17' 27" W.	NAQB	1,000	Dept. of Commerce	300, 600	—	N	—	—	—

Light Vessel No.	Vessel Name	Tonnage	Dept. of Commerce	Value
Light Vessel No. 23	Reed, Conn. 41° 38' 00" N. 71° 38' 28" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 34	Charleston, S.C. 32° 40' 39" N. 79° 43' 41" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 39	Brenton Reef, R.I. 41° 25' 00" N. 71° 22' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 41	Vineyard Sound, Mass. 41° 22' 00" N. 71° 00' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 42	Hen and Chickens, Mass. 41° 27' 02" N. 71° 01' 06" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 44	North East End, N.J. 38° 37' 00" N. 74° 29' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 46	Tail of Horsehoe, Va. 36° 53' 49" N. 76° 00' 24" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 47	Pollock Rip, Mass. 41° 22' 00" N. 69° 34' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 48	Cornfield Point, Conn. 41° 13' 00" N. 72° 23' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 52	Fenwick Island Shoal, Del. 33° 06' 00" N. 74° 46' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 54	Boston, Mass. 42° 20' 22" N. 70° 45' 26" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 66	Great Round Shoals, Mass. 41° 24' 11" N. 69° 54' 55" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 67	Umatilla Reef, Wash. 48° 09' 00" N. 124° 51' 00" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 68	Fire Island, N.Y. 40° 28' 40" N. 73° 11' 26" W.	100	Dept. of Commerce	300, 600
Light Vessel No. 69	Overfalls, Del. 38° 48' 00" N. 75° 01' 00" W.	100	Dept. of Commerce	300, 600

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA - <i>contd.</i>										
Light Vessel No. 70	Meridian of Greenwich. San Francisco, Cal. 37° 45' 03" N. 122° 41' 20" W.	NAKS	100	Dept. of Commerce	300, 600	—	N	—	Frans.	—
Light Vessel No. 72	Diamond Shoals, N.C. 35° 05' 08" N. 75° 18' 38" W.	NITQ	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 73	Pollock Rip Slue, Mass. 41° 36' 00" N. ^s 69° 53' 00" W.	NAFT	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 74	Portland, Maine 43° 41' 30" N. 70° 05' 38" W.	NAMS	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 79	Five Fathom Bank, N.J. 38° 47' 00" N. ^s 74° 34' 00" W.	NADV	125	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 80	Cape Lookout Shoals, N.C. 34° 18' 00" N. ^s 74° 21' 00" W.	NABV	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 81	Heald Bank, Texas 29° 06' 05" N. 94° 13' 27" W.	NLP	100	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 83	Blunts Reef, Cal. 40° 36' 04" N. 124° 30' 14" W.	NACT	150	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 84	Brunswick, Georgia 31° 00' 00" N. ^s 81° 07' 35" W.	NABX	125	Dept. of Commerce	300, 600	—	N	—	—	—
Light Vessel No. 85	Northport Shoals, N.Y. 42° 36' 33" N. 73° 50' 55" W.	NLA	150	Dept. of Commerce	300, 600	—	N	—	—	—

Light Vessel No. 87	Ambergris Channel, N.Y.	NALS	100	Dept. of Commerce	300, 600	—	N
Light Vessel No. 88	40° 36' 20" N. 74° 03' 05" W. Columbia, Oregon	NAJT	100	Dept. of Commerce	300, 600	—	N
Light Vessel No. 91	46° 10' 30" N. 124° 11' 00" W. Winter Quarter Shoals, Va.	NADT	100	Dept. of Commerce	300, 600	—	N
Light Vessel No. 93	37° 55' 00" N. 74° 56' 00" W. Swiftsure Bank, Wash	NABT	100	Dept. of Commerce	300, 600	—	N
Light Vessel No. 94	48° 31' 00" N. 125° 00' 00" W. Frying Pan Shoals, N.C.	NLC	110	Dept. of Commerce	300, 600	—	N
Light Vessel No. 101	33° 33' 30" N. 76° 38' 20" W. Cape Charles, Va.	NAJV	100	Dept. of Commerce	300, 600	—	N
Light Vessel No. 102	37° 05' 00" N. 75° 43' 00" W. South Pass, La.	NAGT	100	Dept. of Commerce	300, 600	—	N
Long Beach, California	28° 53' 19" N. 89° 26' 34" W.	KUNT	—	—	—	—	—
Los Angeles, California	34° 04' 00" N. 118° 15' 00" W.	KLS	1,000	Federal Telegraph Company	300, 600, 1,800, 2,800, 3,250	P G ..	0400 to 2200 ^a
Ludington, Michigan	43° 56' 47" N. 86° 26' 19" W.	NTM	150	U.S. Navy	300, 600	P G ..	N 0.30
Mackinac Island ..	45° 51' 29" N. 84° 36' 57" W.	NUD	150	U.S. Navy	300, 600	P G ..	N 0.30
Manistique ..	45° 57' 26" N. 86° 15' 26" W.	NUB	150	U.S. Navy	300, 600	P G ..	N 0.30
Manitowoc ..	41° 07' 00" N. 87° 45' 00" W.	NTY	150	U.S. Navy	300, 600	D F ..	N 0.30
Mantoloking ..	37° 05' 00" N. 40° 01' 30" N.	NAH	100	U.S. Navy	300, 600	P G ..	N —
Mare Island ..	74° 03' 10" W. 38° 05' 55" N.	NPG	250	U.S. Navy	• 300, 600	P G ..	N 0.30
Marion, Massachusetts	130° 00' 09" W.	NMM	—	Radio Corp. of America	—	—	—
Marion, Massachusetts	—	WSO	—	Radio Corp. of America	12,000	P R ..	N —
Marshfield, Oregon ..	43° 22' 36" N. 124° 12' 50" W.	NPF	250	U.S. Navy	300, 600	P G ..	N 0.30
Miami, Florida ..	25° 48' 21" N. 80° 03' 15" W.	NGE	250	U.S. Navy	300, 600	D F ..	N 0.30

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.	Meridian of Greenwich.									
Miles City ..	Montana	KUNN	—	Miles City—Jordan Wireless Co.	500	P R ..	N	—	—	Frans.
Milwaukee, Wisconsin	43° 02' 50" N. 87° 50' 00" W.	NUK	150	U.S. Navy ..	300, 600	P G ..	N	0.30	—	—
Mobile, Alabama ..	30° 41' 34" N. 88° 02' 27" W.	NGT	150	U.S. Navy ..	300, 600	P G ..	N	0.30	—	—
Montauk Point, New York State	Long Island 41° 02' 08" N. 71° 56' 03" W.	NAH	100	U.S. Navy ..	300, 600	D F ..	N	—	—	—
Morris Island, South Carolina	33° 41' 32" N. 79° 53' 15" W.	NAO	100	U.S. Navy ..	300, 600	D F ..	N	—	—	—
Mount Vernon, Ohio	40° 24' 00" N. 82° 31' 00" W.	WQV	80-90	B. J. Hyatt ..	500	— ¹⁰	X	—	—	—
Nantucket Island, Massachusetts	41° 14' 42" N. 70° 05' 56" W.	NBS	100	U.S. Navy ..	300, 600	D F ..	N	—	—	—
Newark, New Jersey	—	WWU	—	Post Office Dept.	—	— ¹¹	X	—	—	—
New Brunswick, New Jersey ..	40° 31' 00" N. 74° 29' 00" W.	NFF	125	U.S. Navy ..	300, 600	O ..	X	—	—	—
New Brunswick, New Jersey ..	—	WII	—	Radio Corp. of America	13,600	P R ..	N	—	—	—
New London, Connecticut	41° 19' 00" N. 72° 05' 25" W.	NRZ	100	U.S. Navy ..	300, 600	P R ..	N	0.30	—	—
New London, Connecticut WLC	—	WLC	—	International Radio Tel. Co.	300, 600	P G ..	N	0.15 ^{11 12} 0.30 ^{14 12} 0.60 ^{15 12}	—	—
New Dungeness, Washington	—	NFT	—	U.S. Navy ..	800	D F ..	—	—	—	—
New Orleans ..	Louisiana 29° 52' 50" N. 90° 02' 18" W.	NAT	250	U.S. Navy ..	300, 600	O ..	N	—	—	—
New Orleans WNU	—	WNU	—	Tropical Radio Tel. Co.	300, 600	P G ..	X	—	—	—
New Prague, Minnesota	93° 31' 12" N. 44° 32' 39" W.	WPU	300	New Prague Flour Mill Co.	500	P ..	X	—	—	—
Newport, Rhode Island	Coasters Harbour Island 41° 29' 17" N. 71° 10' 44" W.	NAF	100	U.S. Navy ..	300, 600	D F ..	N	—	—	—
Newport, Rhode Island	41° 30' 12" N. 71° 20' 00" W.	NAF	250	U.S. Navy ..	300, 600	P G ..	N	0.30	—	—

	WCI	International Radio Tel. Co.	P G	N	X	0.30
Newport, Rhode Island WCI	KUWS	Police Dept.	P R	N	X	—
New York KUWS	WHB	E. J. Simon	P G	9900 to 1700	—	0.30
New York WHB	WHI	Radio Corp. of America	P G	N	—	0.30
New York WHI	WNY	—	P G	N	—	0.30
New York WSE	WSE	U.S. Navy	P G	N	—	0.30
Norfolk, Virginia	NAM	—	P G	N	—	0.30
North Head	NPE	U.S. Navy	P G	N	—	0.30
North island, South Carolina	NZW	U.S. Navy	D F	N	—	—
Oakland, California	KGI	Ellery W. Stone	P	X	—	—
Ogden, Utah	KUPQ	—	P R	X	—	—
Pass A. Loure, Louisiana	NBX	U.S. Navy	D F	N	—	—
Pensacola, Florida	NAS	U.S. Navy	—	N	—	—
Philadelphia	NAI	U.S. Navy	P G	N	—	0.30
Philadelphia WHE	WHE	—	P R	9900 to 1700	—	—
Phoenix, Arizona	KHQ	Federal Telegraph Co.	P	Local Time. 0600 to 1800	—	—
Port Angeles, California	NFT	U.S. Navy	D F	—	—	—
Point Arguello	NPK	U.S. Navy	P G	N	—	0.30
Point Fermin, California	NPX	U.S. Navy	D F	—	—	—
Point Hueneme, California	NMD	U.S. Navy	D F	—	—	—
Point Isabel	NAV	U.S. Navy	P G	N	—	0.30
Point Montara, California	NLH	U.S. Navy	D F	—	—	—
Point Reyes, California	NLG	U.S. Navy	D F	—	—	—
Port Arthur, Texas	NJY	U.S. Navy	P G	N	—	0.30
Portland, Maine	NAB	U.S. Navy	P G	N	—	0.30
Portland, Oregon	KDP	Charles L. Austin	P	X	—	—
Portland, Oregon KDP	KGN	North Western Electric Co.	P	X	—	—
Port Royal, South Carolina	NAV	U.S. Navy	O	N	—	—

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED STATES OF AMERICA—contd.	Meridian of Greenwich.							Francs.	Francs.	
Portsmouth, New Hampshire	43° 04' 33" N. 70° 44' 00" W.	NAC	150	U.S. Navy	300, 600	P G ..	N	0.30	—	
Princes Neck, Rhode Island	41° 27' 06" N. 71° 20' 15" W.	NAF	100	U.S. Navy	300, 600	D F ..	N	—	—	
Providence, Rhode Island	41° 40' 00" N. 71° 25' 00" W.	WPF	100	Dutree W. Flint	300, 450, 600	P ..	X	—	—	
Puget Sound, Washington	47° 37' 18" N. 122° 37' 08" W.	NPC	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
Relief Lightship No. 53 or 94	—	NLG	—	U.S. Navy	300, 600	—	N	—	—	
Relief Lightship No. 66 or 85	—	NLD	—	—	300, 600	—	N	—	—	
Relief Lightship No. 71 or 72	—	NLE	—	—	300, 600	D F ..	N	—	—	
Richmond Hill, New York State	—	WSK	—	E. J. Simon	—	P G ..	—	—	—	
Rockaway Beach, New York	40° 34' 05" N. 73° 52' 50" W.	NAH	100	U.S. Navy	300, 600	—	N	—	—	
Rockland, Maine	—	WST	—	East Coast Fisheries Co.	300, 600	P G ..	N	—	—	
S. Augustine, Florida	North-east Coast of Florida	NAP	200	U.S. Navy	300, 600	P G, D F	N	0.30	—	
S. Diego, California	29° 55' 07" N. 83° 17' 12" W.	NPL	250	U.S. Navy	300, 600	P G ..	N	0.30	—	
S. Francisco	32° 40' 30" N. 117° 15' 00" W.	NPG	250	U.S. Navy	300, 600	O ..	N ¹⁸	—	—	
S. Francisco NPH	37° 49' 36" N. 122° 30' 06" W.	NPH	—	—	2,400, 4,800	— ¹⁷	—	—	—	
S. Pedro, California	33° 44' 00" N. 118° 17' 00" W.	NPX	200	U.S. Navy	300, 600	P G ..	N	0.30	—	
Sandy Hook, New Jersey	40° 28' 12" N. 74° 01' 06" W.	NAH	100	U.S. Navy	300, 600	—	N	—	—	
Savannah	32° 05' 15" N. 81° 07' 15" W.	NEV	150	U.S. Navy	300, 600	P G ..	N	0.30	—	
Saville, New York State	40° 14' 46" N. 73° 06' 12" W.	NDD	3,000	U.S. Navy	—	O ..	N	—	—	

WTP	41° 24' 00" N. 72° 42' 00" W.	—	Delaware, Lacka- wanna Western Rld. Co.	—	—	—
Scranton, Pennsylvania	Sea Gate ..	150	U.S. Navy ..	300, 600	P G ..	N
Seattle NVL	New York State Long Island 40° 34' 23" N. 74° 00' 12" W. Washington 47° 38' 00" N. ¹ 122° 20' 00" W. Washington 47° 37' 00" N. 122° 20' 00" W.	250	U.S. Navy ..	300, 600	P G ..	N
Seattle KPE	KPE	100	City of Seattle Harbour Dept.	300, 575, 600	P G ..	N
Siasconsett ..	NBS	150	U.S. Navy ..	300, 600	P G ..	N
Smith Island, Virginia	NCZ	100	U.S. Navy ..	300, 600	D F ..	N
Smith Island, Washington	NFH	—	U.S. Navy ..	800	D F ..	—
Tampa, Florida	NGL	—	U.S. Navy ..	300, 600	P G ..	N
Tatoosh ..	NPD	250	U.S. Navy ..	300, 600	P G ..	N
Thompson Falls, Montana	KLL	—	Thompson Falls Power Co. U.S. Navy ..	550, 1700	P R ..	X
Tuckerton, New Jersey	NWW	250	U.S. Navy ..	300, 600	O ..	N
Tucker-on, New Jersey	WGG	—	Radio Corp. of America North-Western Electric Co.	8,000	P G ..	N
Underwood, Washington	KGO	75	U.S. Navy ..	300, 600, 1,700	—	X
University of Florida	NUGC	—	U.S. Navy ..	300, 600	P ..	N
Victor, Colorado	KIW	160	Ajax Gold Mining Co	575	—	—
Virginia Beach	NCZ	135	U.S. Navy ..	300, 600	P G ..	N
Washington ..	NAL	250	U.S. Navy ..	300, 600	P G ..	N
Washington NAA	NAA	—	U.S. Navy ..	2,500 ¹⁰	O .. ¹⁰	—
Washington WUQ	WUQ	—	U.S. Bureau of Standards	—	O ..	—
Washington WWV	WWV	—	—	—	O ..	X

Land Stations—Continued

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles	Controlled by	Wavelengths (the Normal Wavelength in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.		Remarks.
								Per Word.	Minimum Charge.*	
UNITED STATES OF AMERICA—contd.										
Washington NAA ..	Meridian of Greenwich. Virginia 38° 52' 05" N. 77° 04' 47" W.	NAA	1,000 (spark) 2,000 (c.w.)	U.S. Navy	300, 600, 2,500 (spark) 6,000 (c.w.)	O ..	—	Francs.	—	
Watch Hill ..	Rhode Island 41° 18' 21" N. 71° 51' 29" W.	NAF	100	U.S. Navy	300, 800	D F ..	N	—	—	
Wells, Minnesota ..	93° 45' 00" N. 43° 45' 00" W.	WPT	150	Wells Flour Mill Co.	500	P ..	X	—	—	
West Port, Washington ..	—	NHL	—	U.S. Navy	800	D F ..	—	—	—	
Wichita, Kansas ..	37° 42' 00" N. Texas	WQM	200	Kansas Gas and Electric Co.	1,700	P ..	X	—	—	
Wichita Falls ..	—	KUXQ	—	Continental Radio Telegraph and Telephone Co.	1,750	P R ..	N	0.15	1.50	
Wilmington, Delaware ..	39° 44' 16" N. 75° 32' 52" W.	WPP	300	E. I. Dupont de Nemours & Co.	300, 425, 800	—	X	—	—	
Wilmington, North Carolina ..	34° 14' 00" N. 77° 57' 00" W.	NWN	100	U.S. Navy	300, 800	P G ..	N	0.30	—	
Yerba Buena, California ..	Goat Island 37° 48' 30" N. 122° 22' 02" W.	NPG	125	U.S. Navy	300, 800	P R ..	N	0.30	—	
URUGUAY										
Banco Ingles ..	To the south-east of Montevideo 35° 06' 30" S. 55° 55' 30" W.	CWC	100	Government	450, 800	—	—	—	—	¹ The station transmits a weather report each day except Sunday. (See International Time and Weather Signals)
Cerrito ..	Near Montevideo 34° 51' 20" S. 56° 10' 10" W.	CWA	1,000	Government	800, 1,000, 1,250	PG ¹ ..	N	0.53	5.30	
Isla de Lobos ..	35° 01' 39" S. 54° 53' 01" W.	CWB	100	Government	450, 800	—	—	—	—	

VIRGIN ISLANDS	St. Croix ..	18° 12' 12" N. 64° 40' 05" W.	NNI	50	U.S. Navy	..	300, 600	P G ..	N	0.30	—	1 The station also ex- changes official and public correspondence with Fan- ning Island
	St. Thomas ..	18° 20' 23" N. 64° 55' 52" W.	NBB	100	U.S. Navy	..	300, 600	P G ..	N	0.30	—	
WASHINGTON ISLAND	Washington Island	4° 45' 00" N. 161° 10' 00" W.	VQO	150	F. R. Pelly	..	300, 600	P R 1 ..	—	0.60	—	1 The station also ex- changes official and public correspondence with Zan- zibar
WINDWARD PAS- SAGE (See NAVASSA ISLAND)												1 The station also ex- changes public and official correspondence with Pem- ba, Zanzibar
ZANZIBAR	Pemba, Zanzibar ..	5° 14' 00" S. 39° 45' 00" E.	VQE	85	Government	..	300, 600	P G 1 ..	Local Time, 0800 to 1200 1400 to 1600	0.20	1.60	1 The station also ex- changes public and official correspondence with Pem- ba, Zanzibar
	Zanzibar ..	3° 10' 00" S. 39° 11' 00" E.	VPZ	85	Government	..	300, 600	P G 2 ..	1400 to 1600	0.20	1.60	

B. SHIP STATIONS

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
ARGENTINE REPUBLIC							Francs.	Francs.	¹ Operated and controlled by the owner
Alferez Mackinlay	LNB	—	Navy	450, 800	O	N	—	—	
Almirante Brown	LKA	—	Navy	450, 800	O	N	—	—	
Argentino LMS ¹	LMS	260	Soc. Impta. y. Expta. de la Patagonia	300, 800	P G	N	0.40	4.00	
Aristobulo del Valle	LKX	—	Government	300, 450, 800	O	N	—	—	
Asturiano ¹	LMT	260	Soc. Impta. y. Expta. de la Patagonia	300, 800	P G	N	0.40	4.00	
Azopardo	LNF	—	Navy	300, 450, 800	O	N	—	—	
Bahia Blanca LMK	LMK	—	Navy	300, 800	O	N	—	—	
Belgrano LKB	LKB	—	Navy	300, 800	O	N	—	—	
Berna ¹	LLN	135	Nicolas Mihanovich, Ltd.	450, 800	P G	N	0.40	4.00	
Bruselas ¹	LLO	135	Nicolas Mihanovich, Ltd.	300, 800	P G	N	0.40	4.00	
Buenos Aires LKC	LKC	—	Navy	450, 800	O	N	—	—	
Cabo Corrientes ¹	LMO	300	A. M. Delfino y Hermano	300, 800	P G	N	0.40	4.00	
Cabo S. Maria ¹	LMN	300	A. M. Delfino y Hermano	300, 800	P G	N	0.40	4.00	
Camarones ¹	LME	600	A. M. Delfino y Hermano	300, 450, 800	P G	N	0.40	4.00	
Catamarca	LKD	—	Navy	450, 800	O	N	—	—	
Chaco	LKE	—	Government	450, 800	O	N	—	—	
Chubut	LKI	—	Navy	450, 800	O	N	—	—	
Ciudad de Buenos Aires ¹	LLP	135	Nicolas Mihanovich, Ltd.	300, 800	P G	N	0.40	4.00	
Colonía LLO ¹	LLQ	135	Nicolas Mihanovich, Ltd.	300, 800	P G	N	0.40	4.00	
Cordoba LKF	LKF	—	Navy	450, 800	O	N	0.40	4.00	
Corrientes LNG	LNG	—	Navy	300, 450	O	N	—	—	
Draga 13	LNL	55	Government (Department of Public Works)	400	O	X	—	—	
Draga 14C	LNK	60	Government	400	O	X	—	—	
Draga 16C	LMQ	100	Government	450	O	X	—	—	
Draga 209	LLH	—	Government	500	O	N	—	—	
Draga 210	LLI	—	Government	500	O	N	—	—	
Draga 211	LLJ	—	Government	500	O	N	—	—	
Draga 212C	LMW	216	Government	2,000	O	N	—	—	
El Plata LKG	LKG	—	Navy	450, 800	O	N	—	—	
Entre Rios LKH	LKH	—	Navy	450, 800	O	N	—	—	
Eolo	LLR	135	Nicolas Mihanovich, Ltd.	450, 800	P G	N	0.40	4.00	
Formosa LMU ¹	LMU	50	Domingo Barthe	300, 800	P G	N	—	—	
Fragata Sarmiento	LKJ	—	Navy	450, 800	O	N	—	—	
Garibaldi LKK	LKK	—	Navy	450, 800	O	N	—	—	

Ship	Call	Frequency	Power	Remarks	Notes
Gaviera LKL	LKL	135	450, 600	Navy	
Guaraní	LKS	135	300, 600	Nicolás Mihanovich, Ltd.	
Guarda Nacional	LKM	135	300, 600	Navy	
Helios LLL	LKN	150	300, 600	Nicolás Mihanovich, Ltd.	
Humaitá	LMV	150	300, 600	Domingo Barthe	
Independencia	LKN	150	450, 600	Navy	
Ingeniero Iribas	LLL	—	500	Navy	
Ingeniero Luis A.	LKS	—	300, 450, 600	Government	
Huergo	LKO	—	450, 600	Navy	
Jujuy	LLU	80	300, 600	Nicolás Mihanovich, Ltd.	
Labrador LLL	LLV	135	300, 600	Nicolás Mihanovich, Ltd.	
Lambaré	LKP	135	450, 600	Navy	
La Plata LKP	LKO	—	450, 600	Navy	
Libertad	LKM	135	300, 600	Nicolás Mihanovich, Ltd.	
Lisboa LLM	LLW	135	300, 600	Nicolás Mihanovich, Ltd.	
Londres	LKR	135	450, 600	Navy	
Los Andes LKR	LLY	135	300, 600	Nicolás Mihanovich, Ltd.	
Madrid LLY	LNA	—	450, 600	Government	
Ministro Ecurra	LNH	—	800, 450	Navy	
Misiones	LKT	—	600, 1,500	Navy	
Moreno	LKU	—	450, 600	Navy	
Nuevo de Julio	LNC	—	450, 600	Government	
Ona	LKV	—	450, 600	Government	
Pampa	LKK	—	300	Government	
Pampero	LKW	135	450, 600	Navy	
Paraná LKW	LLZ	—	300, 600	Nicolás Mihanovich, Ltd.	
Paris LLZ	LML	—	450, 600	Government	
Patagonia	LKY	—	450, 600	Navy	
Piedrabuena	LKZ	—	300, 450, 600	Navy	
Presidente Mitre	LMG	600	300, 450, 600	A. M. Delfino y Hermano	
Presidente Quintana	LMH	600	300, 450, 600	A. M. Delfino y Hermano	
Primer de Mayo	LLA	—	450, 600	Navy	
Pueyrredon	LNB	—	450, 600	Navy	
Quarandi	LND	—	450, 600	Navy	
Rio de la Plata LMI	LMI	150	300, 600	Compañía de Nav. Santiago Lambruschini	
Rio Negro LNE	LNE	—	450, 600	Government	
Rio Uruguay	LMJ	150	300, 600	Compañía de Nav. Santiago Lambruschini	
Rivadavia	LLC	—	600, 1,500	Navy	
Rosario LLD	LLD	—	450, 600	Navy	
San Martín LLE	LLE	—	450, 600	Navy	
San Martín LMM	LMM	135	300, 600	Nicolás Mihanovich, Ltd.	
Tritón LMB	LMB	135	300, 600	Nicolás Mihanovich, Ltd.	
Uruguay LLF	LLF	—	450, 600	Navy	
Venus LMC	LMC	135	300, 600	Nicolás Mihanovich, Ltd.	
Vicente Fidel Lopez	LMR	80	350, 450, 600	Navy	
Washington LMD	LMD	135	300, 600	Nicolás Mihanovich, Ltd.	
AUSTRALIAN COMMONWEALTH					
Adelaide	GABC	—	—	Navy	
Anzac	GABD	—	—	Navy	
Apolda *	CGZ	—	—	Birt & Co.	

* Operated and controlled by the Amalgamated Wireless (Australia) Ltd., Sydney

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
AUSTRALIAN COMMONWEALTH—contd.							Francs.	Francs.	
Minderoo ¹	VKX	240	Ocean S.S. Co.	300, 600	P G	—	0.20	—	—
Mindini ¹	VJY	240	Burns, Philp & Co.	300, 600	P G	—	0.20	—	—
Montoro ¹	VHT	240	Burns, Philp & Co.	300, 600	P G	—	0.20	—	—
Montalta ¹	VKZ	240	Adelaide S.S. Co., Ltd.	300, 600	P G	—	0.20	—	—
Monilla ¹	VJF	240	Burns, Philp & Co.	300, 600	P G	—	0.20	—	—
Navy Office	VKN	240	Government	600	O	—	—	—	—
Oona ¹	VXN	240	William Crosby & Co., Ltd.	300, 600	P G	—	0.20	—	—
Oonah ¹	VXA	200	Union S.S. Co.	300, 600	P G	—	0.20	—	—
Paratiah ¹	VKU	200	Commonwealth Govt. Line	300, 600	P G	—	0.40	—	—
Parang ¹	VZC	240	Adelaide S.S. Co.	300, 600	P G	—	0.20	—	—
Parramatta	GABS	—	Navy	—	—	—	—	—	—
Pateena ¹	VZD	150	Union S.S. Co.	300, 600	P G	—	0.20	—	—
Piako ¹	—	—	N. Z. S. Co., Ltd.	—	—	—	—	—	—
Platypus	GABT	—	Navy	600	O	—	—	—	—
Port Stephens Base	VKS	—	Government	—	—	—	—	—	—
Protector GABV	GABV	—	Navy	—	—	—	—	—	—
Riverina ¹	VJA	250	Huddart Parker, Ltd.	300, 600	P G	—	0.20	—	—
Rona ¹	VXQ	250	Colonial Sugar Ref. Co.	300, 600	P G	—	0.20	—	—
Rupara ¹	VZA	240	Adelaide S.S. Co.	300, 600	P G	—	0.20	—	—
Shandon VXL ¹	VXL	100	Commonwealth Govt. Line	300, 600	P G	—	0.20	—	—
South Africa ¹	VNS	—	Cape Explosives, Ltd.	—	—	—	—	—	—
Stalwart	GABW	—	Navy	—	—	—	—	—	—
St. George	CGC	—	O. Chong & Co.	300, 600	—	—	—	—	—
Submarine 1 ¹	GABX	—	Navy	—	—	—	—	—	—
Submarine 12 ¹	GABY	—	Navy	—	—	—	—	—	—
Submarine 13 ¹	GABZ	—	Navy	—	—	—	—	—	—
Submarine 14 ¹	GACB	—	Navy	—	—	—	—	—	—
Submarine 15 ¹	GACD	—	Navy	—	—	—	—	—	—
Submarine 17 ¹	GACF	—	Navy	—	—	—	—	—	—
Success ¹	GACH	—	Navy	—	—	—	—	—	—
Sumatra CGP	CGP	150	Government	300, 600	P G	X	0.20	—	—
Sava ¹	VJI	200	Australian United S.S. Co.	300, 600	P G	—	0.20	—	—
Swan GACJ	GACJ	—	Navy	—	—	—	—	—	—
Swordsmen	GACK	—	Navy	—	—	—	—	—	—
Sydney GACL	GACL	—	Navy	—	—	—	—	—	—
Tasmania	CGY	240	G. S. Yuill & Co.	300, 600	P G	—	0.20	—	—
Tasmania ¹	VXD	200	Commonwealth Government	300, 600	P G	—	0.40	—	—
Tasmania ¹ GACM	GACM	—	Navy	—	—	—	—	—	—
Tasmania ¹ GACN	GACN	—	Navy	—	—	—	—	—	—

Toronto ²	CGL	240	Commonwealth Government Line	300, 600	—	—	0.40	—	Operated by the Radio Corporation of America
Torrens	GACP	—	Navy	—	—	—	—	—	
Ulmara ¹	VHY	250	Huddart Parker, Ltd.	300, 600	—	—	0.20	—	
Una	GACQ	—	Navy	—	—	—	—	—	
Victoria VHX	VHX	250	W. J. L. Liu, Sydney	300, 600	—	—	0.20	—	
Waikawa	—	300	Union S.S. Co.	—	—	—	—	—	
Waikawa	GCNY	300	Union S.S. Co.	—	—	—	—	—	
Wandilla ¹	VHI	240	Adelaide S.S. Co.	300, 600	—	—	0.20	—	
Warra VKI	VKI	—	Navy	600	—	—	—	—	
Warrego	GACR	—	Navy	—	—	—	—	—	
Westralia ¹	VJB	250	Huddart Parker, Ltd.	300, 600	—	—	0.20	—	
Winfield	CCR	—	Adelaide S.S. Co.	300, 600	—	—	—	—	
Wodonga ¹	VHK	240	Australian United S.S. Co.	300, 600	—	—	0.20	—	
Wyandra ¹	VHW	240	Australian United S.S. Co.	300, 600	—	—	0.20	—	
Wyreema ¹	VJG	200	Australian United S.S. Co.	300, 600	—	—	0.20	—	
Yankailila	VZN	—	Adelaide S.S. Co.	300, 600	—	—	—	—	
Yarra ¹	GACS	—	Navy	—	—	—	—	—	
Zealandia ¹	VJC	240	Huddart Parker, Ltd.	300, 600	—	—	0.20	—	
BAHAMAS									
Energie ¹	VRH	200	Scottish Mexican Oil Co.	300, 600	—	—	0.40	—	
BELGIUM									
Albertville ¹	OTV	200	Cie Maritime du Congo	300, 600	—	—	0.40	—	
Alger ¹	ONQ	150-200	Lloyd Royal Belge	300, 600	—	—	0.40	—	
Anvers ¹	OOV	—	Soc. d'Armement Adolff Deppe	—	—	—	0.40	—	
Anversville ¹	OOA	100-150	S. A. Anversoise de Navigation	300, 600	—	—	0.40	—	
Anversville ¹	ONV	200	Cie Maritime du Congo	300, 450, 600	—	—	0.40	—	
Armistice ¹	ONM	—	Cie d'Armement Adolff Deppe	—	—	—	—	—	
Australier ONU ¹	ONU	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Austranne ¹	OPU	100-150	Cie Royale Austrienne des Mines	300, 600	—	—	0.40	—	
Avenir (L) ¹	ONE	170	Assoc. Maritime Belge	300, 450, 600	—	—	0.40	—	
Belgier ¹	OOB	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Bolvier ¹	ORV	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Calcutier ¹	ONC	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Colombie ¹	OOO	100-150	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Comte de Flandre ¹	OOD	100-150	L. Dens & Co. (London)	300, 600	—	—	0.40	—	
Delos ¹	OOD	—	—	—	—	—	—	—	
Director Gerling	ORD	75-120	S. A. de Remorqueur à Helice (Antwerp)	300, 600	—	—	—	—	
Eglantier ¹	OEE	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Emmanuel Nobel ¹	OOL	100-150	S. A. d'Armement d'Industrie et de Commerce	300, 600	—	—	0.40	—	
Erivan ¹	OTE	—	S. A. d'Armement d'Industrie et de Commerce	—	—	—	0.40	—	
Gallacier ¹	ORC	150-175	Lloyd Royal Belge (Antwerp)	—	—	—	0.40	—	
Gallier ¹	ONG	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Gantioise ¹	OOG	100-150	S. A. Anversoise de Navigation	300, 600	—	—	0.40	—	
General Degoutte ¹	OTR	150-200	Soc. Maritime Belge (Ghent)	300, 600	—	—	0.40	—	
General Leman ¹	ONL	30-40	Government	300, 600	—	—	—	—	
Gotthand ¹	ORG	—	Red Star Line (Antwerp)	—	—	—	0.40	—	
Grand Remorqueur	OSR	20	Government	300, 450, 600	—	—	—	—	
Hastler ¹	ORH	150-200	Lloyd Royal Belge	300, 600	—	—	0.40	—	
Indier ¹	ONI	150-200	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	
Italia ¹	OOL	100-150	Lloyd Royal Belge (Antwerp)	300, 600	—	—	0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
BELGIUM—contd.									
Jan Breydel	ONJ	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Kasbek ¹	OOK	—	S.A. d'Armement d'Industrie et de Commerce	—	P G ..	N	0.40	4.00	
Keltier ¹	OOQ	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	X	0.40	4.00	
Kremlin ¹	ORK	—	S.A. d'Armement d'Industrie et de Commerce	—	P G ..	N	0.40	4.00	
Lapland ¹	ORL	150-200	Red Star Line (Antwerp)	300, 450, 600	P G ..	N	0.40	4.00	
Le Rapide	OPR	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Londonier ¹	ONO	180	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Memming ¹	ORE	—	Soc. Belge d'Armement Maritime	—	—	—	—	—	
Menapier ¹	OPM	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Nervier ¹	OPN	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Nipponier ¹	ONN	—	Lloyd Royal Belge (Antwerp)	—	P G ..	N	0.40	4.00	
Northland ¹	ORZ	—	Red Star Line (Antwerp)	—	P G ..	N	0.40	4.00	
Oural ¹ ..	ORU	—	S.A. d'Armement d'Industrie et de Commerce	—	P G ..	N	0.40	4.00	
Patagonier ¹	ONP	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Pionier ¹	ORP	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	X	0.40	4.00	
Persier ¹	OPS	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Pervier ¹	OPP	150-200	Lloyd Royal Belge	300, 600	P G ..	X	0.40	4.00	
Pieter de Coninck	OPK	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Princesse Clémentine	OOP	100-150	L. Denis & Cie.	300, 600	P G ..	N	0.40	4.00	
Princesse Clémentine	OPC	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Princesse Elizabeth	OPE	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Princesse Henriette	OPH	100-150	Government	300, 600	P R ² ..	N ²	— ²	— ²	
Republica Argentina ¹	OPG	—	Soc. d'Armement Adolf Deppe	—	P G ..	N	0.40	4.00	
Rogier ¹ ..	ONR	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Roi Albert ¹	ORA	—	Soc. d'Armement Adolf Deppe	—	P G ..	N	0.40	4.00	
Roumanier ¹	ORR	100-150	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Sandland ¹	ORS	—	Red Star Line (Antwerp)	—	P G ..	N	0.40	4.00	
Serbier ¹	OOS	100-150	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Siellier ¹ ..	ONS	100-150	Lloyd Royal Belge (Antwerp)	300, 600	P G ..	N	0.40	4.00	
Sierra Belgrano ¹	OTZ	150-200	Lloyd Royal Belge	300, 600	P G ..	X	0.40	4.00	
Sierra Blanca ¹ ..	OSB	—	S.A. Transoceanique de Transports Paris	—	P G ..	N	0.40	4.00	
Sierra de Fuentes ¹	OSF	150-200	S.A. Transoceanique de Transports Paris	300, 600	P G ..	X	0.40	4.00	

	OSD	150-200	S.A. Transoceanique de Transports Paris	300, 600	P G	X	0.40	4.00	
Sierra de Madre	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Sierra Grande ¹	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Sierra Leone ¹	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Sierra Morena ¹	..	150-200	S.A. Transoceanique de Transports Paris	300, 600	P G	X	0.40	4.00	
Sierra Negra ¹	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Sierra Roja ¹	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Sierra Quemada ¹	S.A. Transoceanique de Transports Paris	—	P G	N	0.40	4.00	
Stad Antwerpen	..	100-150	Government	300, 600	P R ²	N ²	— ³	— ³	
Tongtong ¹	..	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G	N	0.40	4.00	
Trevier ¹	..	150-200	Lloyd Royal Belge (Antwerp)	300, 600	P G	N	0.40	4.00	
Tunis ¹	Armement Adolf Deppe	—	P G	N	0.40	4.00	
Tunis ¹	Armement Adolf Deppe	—	P G	N	0.40	4.00	
Ubier ¹	100-200	Lloyd Royal Belge	300, 600	P G	X	0.40	4.00	
Ubier ¹	100-200	Lloyd Royal Belge	300, 600	P G	N	0.40	4.00	
Ville d'Anvers	100-150	Government	300, 600	O	N	0.40	4.00	
Ville de Liege	100-150	Government	300, 600	P R ²	N ²	— ³	— ³	
BERMUDA									
Powerful	J. S. Darrell & Co.	—	—	—	—	—	
BRAZIL									
Acre ¹	100	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	
Ada PUY ¹	120	Cia Brasileira de Cabotagem	300, 600	O ⁴	N	0.40	4.00	
Alagoas	..	60	Navy	300	P G	N	0.40	4.00	
Alegrete ¹	100	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Alenas ¹	150	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Almirante Jacaguay ¹	..	190	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	
Amazonas	..	60	Navy	300	P G	N	0.40	4.00	
Anna PUA ¹	150	Empreza Hoepcke	300, 600	P G	N	0.40	4.00	
Antonina ¹	150	Lloyd Nacional	—	P G	N	0.40	4.00	
Aracaju ¹	60	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Aracaty ¹	200	Cia Commercio e Nav.	300, 500, 600	P G	N	0.40	4.00	
Araguay ²	200	Cia Commercio e Nav.	300, 500, 600	P G	N	0.40	4.00	
Assis ¹	200	Pereira Carneiro & Co.	300, 500, 600	P G	N	0.40	4.00	
Atalaia ¹	100	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Avare ¹	400	Lloyd Brasileiro	600	P G	N	0.40	4.00	
Aymoré ¹	190	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	
Ayruoca ¹	60	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Baependy ¹	60	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Baré ¹	150	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Bahia SNB ¹	150	Navy	600	O ⁴	N	0.40	4.00	
Bahia SRE ¹	250	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	
Barbacena ¹	100	Lage & Bros.	300, 600	P G	N	0.40	4.00	
Barroso	..	150	Navy	600	O ⁴	N	0.40	4.00	
Belen ¹	150	Lloyd Nacional	300, 600	P G	N	0.40	4.00	
Belmonte ¹	150	Navy	300, 600	O ⁴	N	0.40	4.00	
Benevente ¹	—	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	
Benjamin Constant	..	150	Navy	600	O ⁴	N	0.40	4.00	
Brazil SRM ¹	190	Lloyd Brasileiro	300, 600	P G	N	0.40	4.00	

¹ Operated and controlled by the Marconi International Marine Communication Co., Ltd., Rio de Janeiro, Brazil

² Operated by the owners

³ Public correspondence on behalf of the garrison only

⁴ Sailing ship

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
BRAZIL—contd.									
Brazil PVN ¹	PVN	150	Lloyd Nacional	300, 600	P G	N	Francia.	—	
Brazilera ¹	PUV	100	Conto & Cia	300, 600	P G	N	0.40	—	
Cabello ¹	PUB	100	Lage & Bros.	300, 600	P G	N	0.40	—	
Campello ¹	PVB	150	Lloyd Nacional	300, 600	P G	N	0.40	—	
Campinas ¹	PVD	90	Lloyd Nacional	300, 600	P G	N	0.40	—	
Campes ¹	STR	200	Lloyd Brasileiro	600	P G	N	0.40	—	
Cannavieiras ¹	PUO	150	Navegacao Bahiana	300, 600	P G	N	0.40	4.00	
Capivary ¹	PPE	200	Pereira Carneiro & Co.	300, 500, 600	P G	N	0.40	—	
Carlos Gomes	SOE	80	Navy	300	O	N	0.40	—	
Caxambu ¹	SSW	100	Lage & Bros.	300, 600	P G	N	0.40	—	
Caxias ¹	SST	400	Lloyd Brasileiro	600	P G	N	0.40	—	
Ceara SRD ¹	SRD	250	Lloyd Brasileiro	300, 600	P G	N	0.40	—	
Ceara SNC	SNC	75	Navy	—	O	N	0.40	—	
Comandante Belham ¹	SSB	—	Lloyd Brasileiro	300, 600	P G	N	0.40	—	
Comandante Belham ¹	PUO	150	Navegacao Bahiana	300, 600	P G	N	0.40	—	
Comandante Belham ¹	PPF	200	Cia Comm. e Nav.	300, 500, 600	P G	N	0.40	—	
Corcovado PPF ¹	PPF	200	Cia Comm. e Nav.	300, 500, 600	P G	N	0.40	—	
Curitiba ¹	PUF	150	Lage & Bros.	300, 600	P G	N	0.40	—	
Curvello ¹	SSN	400	Lloyd Brasileiro	600	P G	N	0.40	4.00	
Cuyaba ¹	SSH	400	Lloyd Brasileiro	600	P G	N	0.40	4.00	
Deodoro	SND	150	Navy	600	P G	N	0.40	—	
Florianopolis ¹	SNF	150	Navy	600	O	N	0.40	—	
Goyaz ¹	SRZ	150	Lloyd Brasileiro	300, 600	P G	N	0.40	—	
Goyaz ¹	SSC	150	Lloyd Brasileiro	300, 600	P G	N	0.40	—	
Guabarara ¹	PVH	250	Lloyd Nacional	300, 600	P G	N	0.40	—	
Guaratuba ¹	PVT	150	Navegacao Bahiana	300, 600	P G	N	0.40	—	
Guaratuba ¹	PUE	150	Lage & Bros.	300, 600	P G	N	0.40	—	
Guarupia ¹	PPG	200	Cia Comm. e Nav.	300, 500, 600	P G	N	0.40	—	
Iguassu ¹	STS	100	Lage & Bros.	300, 600	P G	N	0.40	—	
Iguassu ¹	PUN	150	Navegacao Bahiana	300, 600	P G	N	0.40	—	
Iguassu ¹	SSK	60	Lage & Bros.	300, 600	P G	N	0.40	—	
Ira SRU ¹	SRU	190	Lloyd Brasileiro	300, 600	P G	N	0.40	—	
Itabera ¹	STK	250	Cia N. Navegacao Costeira	300, 600	P G	N	0.40	—	
Itagiba ¹	STF	250	Cia N. Navegacao Costeira	300, 600	P G	N	0.40	—	

Itapava ¹	PPY	150	Cia N. Navegacao Costeira	..	—	PG	..	N	0.40
Itatuba ¹	PPZ	150	Cia N. Navegacao Costeira	..	300, 600	PG	..	N	0.40
Itajuba ¹	STG	240	Cia N. Navegacao Costeira	..	—	PG	..	N	0.40
Itamaracá ¹	STL	150	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itapacy ¹	PPV	150	Cia N. Navegacao Costeira	..	—	PG	..	N	0.40
Itapema ¹	STH	240	Cia N. Navegacao Costeira	..	300, 600	PG	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itaperuna ¹	PPX	150	Cia N. Navegacao Costeira	..	300, 600	PG	..	N	0.40
Itapuca ¹	STI	240	Cia N. Navegacao Costeira	..	300, 600	PG	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itapuihy ¹	STD	190	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itapura ¹	STA	190	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itaquera ¹	STE	190	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itaquatia ¹	PVY	250	Cia N. Navegacao Costeira	..	300, 600	PN	..	N	0.40
Itassucé ¹	STC	190	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itatinga ¹	STB	190	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Itaúba ¹	STJ	240	Cia N. Navegacao Costeira	..	300, 600	P G	..	0600 to 0800 1000 to 1200 1400 to 1600 1800 to 2000	0.40
Ititá ¹	SSF	150	Lage & Bros.	..	300, 600	PG	..	N	0.40
Jaboatã ¹	SSI	150	Lage & Bros.	..	300, 600	PG	..	N	0.40
Jacubá ¹	PPI	200	Cia Comm. e Nav.	..	300, 500, 600	PG	..	N	0.40
Jaguaripe ¹	SOJ	30	Navy	..	100	O	..	N	0.40
Jaguaripe ¹	PPK	200	Cia Comm. e Nav.	..	300, 500, 600	PG	..	N	0.40
Javary ¹	SRV	150	Lloyd Brasileiro	..	300, 600	PG	..	N	0.40
Jequitinhonha ¹	PUP	150	Navegacao Bahiana	..	300, 600	PG	..	N	0.40
Joazeiro ¹	PUH	100	Lage & Bros.	..	300, 600	PG	..	N	0.40
Jose Bonifado	SNJ	—	Navy	..	—	O	..	N	0.40
Lages ¹	PUI	100	Lage & Bros.	..	300, 600	PG	..	N	0.40

4.00

Port of Origin	Ship	Company	Class	Capacity	Speed	Remarks
Rio Grande do Norte	SNS	60	..	..	..	..
Rio Grande do Sul	SNT	130	..	..	..	..
Ruy Barbosa ¹	SKT	100	..	..	..	..
Sabara ¹	STI	60	..	..	..	..
Santa Catharina	SNK	60	..	..	..	..
Santarem ¹	PUC	100	..	..	..	..
Santos SSY ²	SSV	130	..	..	..	..
Sao Paulo SNP ²	SNP	430	..	..	..	..
Sao Paulo SRC ¹	SRC	250	..	..	..	..
Sargento Albuquerque	SOK	50	..	..	..	..
Satellite ¹	SRG	190	..	..	..	..
Sergeio SNO	SNO	60	..	..	..	..
Sergipe SRH ¹	SRH	190	..	..	..	..
Servulo Dourado ³	SRR	190	..	..	..	..
Sirio ¹	SRW	190	..	..	..	..
Sobral ¹	SSR	150	..	..	..	..
Sousmarin F.1	SOW	25	..	..	..	..
Sousmarin F.3	SOX	25	..	..	..	..
Sousmarin F.3	SOZ	25	..	..	..	..
Tabatinga ³	PUB	25	..	..	..	..
Tapajoz ²	PPA	250	..	..	..	..
Taquary ²	PFS	200	..	..	..	..
Taubaté ¹	STO	100	..	..	..	..
Therézina ²	STM	200	..	..	..	..
Tibagy ²	PPU	200	..	..	..	..
Tiradentes	SOT	50	..	..	..	..
Uberaba ²	SSZ	400	..	..	..	..
Victoria STW ¹	STW	100	..	..	..	..
Wenceslau Braz ¹	SSA	125	..	..	..	..
Zilka ¹	PUZ	120	..	..	..	..
Parisian ¹	VRI	200	..	..	..	..
Canada S.S. Lines, Ltd.	CJE	—	..	..	..	..
Depart. of Marine	VDC	100	..	..	..	..
Government	VDT	200	..	..	..	..
Canadian Pacific S.S. Co.	VFO	200	..	..	..	..
B. D. Rogers, Vancouver	VFL	80	..	..	..	..
Depart. of Marine	VDO	200	..	..	..	..
Canadian Pacific S.S. Co.	VGI	200	..	..	..	..
Canadian Pacific S.S. Co.	VGG	200	..	..	..	..
Canadian Atlantic and Plant S.S. Co.	VFW	200	..	..	..	..
Leonard Fisheries, Ltd.	VBX	—	..	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum Radiotelegram.	
CANADA—contd.							Francs.	Francs.	
Bellona VEP ¹	VEP	200	Dollar S.S. Lines, Ltd.	300, 600	P G	N	0.40	—	
Bessie Dollar ¹	VFO	200	Canadian Pacific S.S. Co.	300, 600	P G	N	—	—	
Boston VFS ¹	VFS	200	Union S.S. Co., of B.C., Ltd.	300, 600	P G	N	0.40	—	
Canosun ¹	VFZ	200	Government	300, 600	O	X	—	—	
Canada VDC ¹	VDC	150	Canadian Government	—	—	—	—	—	
Canadian Adventurer ¹	XWD	—	Canadian Government Merchant Marine	—	—	—	—	—	
Canadian Miller ¹	XVZ	—	Canadian National Railways	—	—	—	—	—	
Canadian Pioneer ¹	CKT	—	Canadian National Railways	—	—	—	—	—	
Canadian Ranger ¹	XVF	—	Canadian National Railways	—	—	—	—	—	
Canadian Recruiter ¹	XVK	—	Canadian National Railways	—	—	—	—	—	
Canadian Sailor ¹	XVR	—	Canadian National Railways	—	—	—	—	—	
Canadian Signaller ¹	XVS	—	Canadian National Railways	—	—	—	—	—	
Canadian Trader ¹	XVP	—	Canadian National Railways	—	—	—	—	—	
Canadian Volunteer ¹	XVM	—	Canadian National Railways	—	—	—	—	—	
Canadian Voyageur ¹	CKS	—	Canadian National Railways	—	—	—	—	—	
Canadian Warrior ¹	XVA	—	Canadian National Railways	—	—	—	—	—	
Canora ¹	CKD	—	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—	
Cascopedia ¹	VEO	200	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—	
Cayuga VEL ¹	VEL	100	Victoria Harbour Lumber Co.	—	—	—	—	—	
Charlton ¹	VEX	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Charlybdis ¹	BPE	200	Union S.S. Co. of B.C., Ltd.	300, 600	P G	N	0.40	—	
Chelohsin ¹	VGN	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—	
Chitcola ¹	VEJ	100	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Chippewa ¹	VEH	100	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Chillingwood ¹	CKP	100	Canada S.S. Lines, Ltd.	300, 600	P G	N	0.40	—	
Corona VEB ¹	VEB	100	Canadian National Railways	300, 600	P	N	0.40	—	
Dalhousie City ¹	VEA	100	Southern Salvage Co.	300, 600	P	N	0.40	—	
Dellavance ²	VFF	100	Dept. of Marine	300, 600	P	N	0.40	—	
Dollard ²	VDO	150	Dept. of Marine	300, 600	P	N	0.40	—	
Douglas H. Thomas ¹	VGR	125	Dominion Coal Co., Ltd.	300, 600	P	N	0.40	—	
Druid ¹	VDR	100	Dept. of Marine	300, 600	P	N	0.40	—	
Durley Chine ²	VDH	200	Dept. of Marine	300, 600	P	N	0.40	—	
E. B. Oiler ¹	VDI	100	Dept. of Marine	300, 600	P	N	0.40	—	
Empire ¹ (Barge)	CKE	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Empire ¹ (Barge)	CKF	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Empire ¹ (Barge)	CKG	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Empire of Japan ¹	CKH	—	Canadian Pacific Railway Co.	—	—	—	—	—	
Empress of Japan ¹	CKI	—	Canadian Pacific Railway Co.	—	—	—	—	—	

Ship	Company	Class	Year	Port	Agent	Capacity	Remarks
Empress of Russia ¹	Canadian Pacific Railway Co.	C. A. Barnard	250	..	..	300, 600	..
Frontenac ¹	Dept. of Marine	..	200	..	..	300, 600	..
Esmeralda ¹	Canada Atlantic and Plant S.S. Co.	..	200	..	..	300, 600	..
Everett G. Griggs ²	Everett G. Griggs S. Co.	..	100	..	..	300, 600	..
Florence ¹	T. Eaton (Toronto)	..	150	..	..	300, 600	..
Galiano ¹	Government	..	200	..	..	300, 600	..
Garden City ¹	Niagara, St. Catharines and Toronto Nav. Co.	..	100	..	..	300, 600	..
Glenfennan ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
Glenisle ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
Glenlyon ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
Glenmavis ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
Glenorchy ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
Glenushee ¹	Great Lakes Transp. Co., Ltd.	..	..	..	..	..	..
G. R. Crowe ¹	Montezuma Transp. Co., Ltd.	..	..	..	..	..	..
Guiana ¹	Canada S.S. Lines, Ltd.	..	200	..	..	300, 600	..
Halifax ¹	Canada Atlantic and Plant S.S. Co.	..	200	..	..	300, 600	..
Hamonic ¹	Northern Navig. Co.	..	200	..	..	..	..
Harold Dollar ¹	Dollar S.S. Lines	..	..	..	..	..	..
Hazel Dollar ¹	Dollar S.S. Lines	..	..	..	..	..	..
Hochelaga ¹	Doulin Iron and Steel Co.	..	..	..	..	300, 600	..
Huron ¹	Northern Navig. Co.	..	200	..	..	..	..
Icolite ¹	Imperial Oil Co., Ltd.	..	..	..	..	..	..
Imperoyal ¹	Imperial Oil Co., Ltd.	..	..	..	..	..	..
Impoco ¹	Imperial Oil Co., Ltd.	..	..	..	..	..	..
J. H. G. Haggarty ¹	Canada S.S. Lines, Ltd.	..	200	..	..	300, 600	..
Keewatin ¹	Canada S.S. Lines, Ltd.	..	..	..	..	..	..
Kerry Range ¹	Stm. Navig. of Canada, Ltd.	..	..	..	..	..	..
Kingston ¹	Canada S.S. Lines	..	100	..	..	300, 600	..
Korona ¹	Canada S.S. Lines	..	200	..	..	300, 600	..
Lady Evelyn ²	Post Office Dept.	..	100	..	..	300, 600	..
Lady Grey ²	Dept. of Marine	..	100	..	..	300	..
Lady Laurier ²	Dept. of Marine	..	150	..	..	300	..
Laketon ¹	Matthews S.S. Co.	..	..	..	..	..	..
Lingan ¹	Dominion Coal Co.	..	..	..	..	..	..
Lord Ormond ¹	Dominion Mercantile Marine Corp. Ltd.	..	..	..	..	..	..
Lord Dufferin ¹	Canada S.S. Lines, Ltd.	..	..	..	..	..	..
Lord Strathcona VFX ¹	Quebec Salvage & Wrecking Co.	..	80	..	..	300	..
Lucknow ¹	Midland Transp. Co.	..	..	..	..	..	..
Maccasa ¹	Canada S.S. Lines, Ltd.	..	100	..	..	300, 600	..
Majestic VEM ¹	Canada S.S. Lines, Ltd.	..	100	..	..	300, 600	..
Malaspina ¹	Canada S.S. Lines, Ltd.	..	200	..	..	300, 600	..
Manitoba ¹	Government	..	200	..	..	300, 600	..
Manxman ¹	Canadian Pacific S.S. Co.	..	..	..	..	..	..
Margaret VDW ²	R. Lawrence Smith Co.	..	200	..	..	300, 600	..
Mariska ¹	Dept. of Customs	..	..	..	..	..	..
Martian ¹	Transatlantic S.S. Co., Ltd.	..	..	..	..	..	..
Maskinonge ¹	Canada S.S. Lines, Ltd.	..	..	..	..	..	..
Melville Dollar ¹	Dominion Coal Co., Ltd.	..	..	..	..	..	..
Midland King ¹	Dollar S.S. Co.	..	200	..	..	300, 600	..
Midland Prince ¹	Canada S.S. Lines, Ltd.	..	..	..	..	..	..
Mina Brea ¹	Dollar S.S. Co.	..	..	..	..	..	..
Minto ² ..	International Petro Co.	..	..	..	..	300, 600	..
..	Dept. of Marine	..	150	..	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength In Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
CANADA—contd.									
Montcalm VDJ ²	VDJ	150	Dept. of Marine	300, 600	O	X	—	—	
Monteagle ¹	CJV	250	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—	
Montmagny ²	VDK	200	Dept. of Marine	300, 600	O	X	—	—	
Montreal ¹	VCW	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Montserrat ¹	VFN	200	Black Diamond S.S. Co.	300, 600	P G	N	0.40	—	
Newington ²	VDP	100	Dept. of Marine	300	O	X	—	—	
Newport ¹	CJW	—	Fraser Brace & Clarke, Ltd.	—	—	—	—	—	
Niobe VDA ²	VDA	—	Navy	—	—	—	—	—	
Noronc ¹	VGV	200	Northern Navig. Co.	300, 600	P G	N	0.40	—	
Ocano ¹	CHS	—	Newport S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Ontario No. 1 ³	VGU	200	Ontario Car Ferry Co.	300, 600	P G	N	0.40	—	
Parima ¹	CJX	—	Quebec S.S. Co., Ltd.	—	—	—	—	—	
Pathfinder ¹	—	—	James Playfair	—	—	—	—	—	
Prince Albert ²	VFL	200	Grand Trunk Rly. Coast S.S. Co.	300, 600	P G	N	0.40	—	
Prince Arthur ¹	VGI	200	Boston & Yarmouth S.S. Co.	300, 600	P G	N	0.40	—	
Prince George VGG ¹	VGK	200	Boston & Yarmouth S.S. Co.	300, 600	P G	N	0.40	—	
Prince John ²	VFM	200	Grand Trunk Rly. Coast S.S. Co.	300, 600	P G	N	0.40	—	
Princess Adelaide ¹	VFA	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Alice ¹	VFD	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Beatrice ¹	VFC	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Charlotte ¹	VFE	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Ena VFJ ¹	VFI	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Maquina ¹	VGT	200	Canadian Pacific S.S. Co.	300, 600	P G	N	0.40	—	
Princess Maquinna ¹	VGT	200	Canadian Pacific S.S. Co.	300, 600	P G	N	0.40	—	
Princess Mary ¹	VFB	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess May ¹	VFH	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Patricia ²	VGZ	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Royal VFG ¹	VFG	100	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Princess Sophia ¹	VFI	200	Canadian Pacific Rly. Co.	300, 600	P G	N	0.40	—	
Province ¹	VFR	200	Can. Towing & Wrecking Co.	300, 600	P G	N	0.40	—	
Quadra ²	VDM	100	Dept. of Marine	300	O	X	—	—	
Quebec ¹	XVE	—	Canada S.S. Lines, Ltd.	—	—	—	—	—	
Rainbow VDR ²	VDB	—	Navy	—	—	—	—	—	
Rapids King ²	VGB	200	Canada S.S. Co., Ltd.	300, 600	P G	N	0.10	—	
Reginald ¹	VEY	—	Victoria Harbour Lumber Co.	—	—	—	—	—	
Reginotte ¹	CHW	—	Imperial Oil Co., Ltd.	—	—	—	—	—	
Renvoye ¹	CJY	—	Imperial Oil Co., Ltd.	—	—	—	—	—	
Riverton ¹	VBI	—	Canada S.S. Co., Ltd.	—	—	—	—	—	
Robert Dollar ¹	VGM	200	Dollar S.S. Lines	300, 600	P G	N	—	—	0.40

[illegible]

Ship Stations—Continued.

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
CHILE—contd.							Francs.	Francs.	
Jarpa ..	CBJ	—	Navy	—	O	—	—	—	
Limari ..	CAL	250	Compania Sud-Amer. de Vapores	300, 600	P	N	0.40	4.00	
Lynch ..	CBY	—	Navy	—	G	—	—	—	
Maipo CBU	CBU	—	Navy	—	O	—	—	—	
Maipo CAB	CAB	250	Compania Sud-Amer. de Vapores	300, 600	P	X	0.40	4.00	
Mapocho ..	CAM	—	Compania Sud-Amer. de Vapores	300, 600	P	X	0.40	4.00	
O'Brien CBN	CBN	—	Navy	—	G	—	—	—	
O'Higgins ..	CBH	—	Navy	—	O	—	—	—	
Orella ..	CBO	—	Navy	—	O	—	—	—	
Palena ..	CAP	250	Compania Sud-Amer. de Vapores	300, 600	P	—	—	—	
Prat ..	CBP	—	Navy	—	G	N	0.40	4.00	
Rancagua ..	CBW	—	Government	—	O	—	—	—	
Riquelme ..	CBR	—	Navy	—	O	—	—	—	
Serrano ..	CBS	—	Navy	—	O	—	—	—	
Talcahuano ..	CBT	—	Navy	—	O	—	—	—	
Thompson CBT	CBT	—	Navy	—	O	—	—	—	
Tome ..	CBM	—	Navy	—	O	—	—	—	
Zenteno ..	CBZ	—	Navy	—	O	—	—	—	
CHINA									
Chao-Ho ..	XNW	—	Navy	—	O	—	—	—	
Chu-Chien ..	XON	—	Navy	—	O	—	—	—	
Chu-Kwan ..	XOG	—	Navy	—	O	—	—	—	
Chu-Tai ..	XOA	—	Navy	—	O	—	—	—	
Chu-Tung ..	XOD	—	Navy	—	O	—	—	—	
Chu-Yew ..	XOY	—	Navy	—	O	—	—	—	
Chu-Yu ..	XOU	—	Navy	—	O	—	—	—	
Fei-Ying ..	XPS	—	Navy	—	O	—	—	—	
Foo-An ..	XNL	—	Navy	—	O	—	—	—	
Hai-Chow ..	XSW	—	Navy	—	O	—	—	—	
Hai-Chi ..	XSC	—	Navy	—	O	—	—	—	
Hai-Shan ..	XSP	—	Navy	—	O	—	—	—	
Hai-Ying ..	XSV	—	Navy	—	O	—	—	—	
Kiang-Chien ..	XOC	—	Navy	—	O	—	—	—	
Kiang-Han ..	XOH	—	Navy	—	O	—	—	—	
Kiang-Li ..	XOR	—	Navy	—	O	—	—	—	
Kiang-Yuen ..	XQU	—	Navy	—	O	—	—	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
DENMARK—contd.									
Flora ..	OWE	—	Navy ..	600	O ^s ..	X	—	—	
Flyveskjen ..	OVF	200	Nord-Osters ³ Co. ..	600	O ^s ..	0800 to 0900	—	—	
Fredericia ..	OYT	200	Navy ..	300, 450, 600	P ..	1200 to 1300	—	—	
Frederik VIII ¹	OZL	200	Det Forenede Damps. A.S., Copen.	300, 600	P G ..	N ..	0.40	4.00	
Galathea ..	OVG	—	Navy ..	600	O ^s ..	1800 to 1900	—	—	
Gejser ..	OUG	100	Navy ..	600	O ^s ..	X	—	—	
Georg Stage ²	OZY	100	S.A. Georg Stages Minde..	300, 600	P ..	X	—	—	
Grönsund ..	OWF	—	Navy ..	600	O ^s ..	X	—	—	
Guldborgsund ..	OWG	—	Navy ..	600	O ^s ..	X	—	—	
Gullfoss ³	OZU	200	Islands Dampskibsselskab (Eims- kipstøteleg Islands)	300, 600	P ..	X	0.40	4.00	
Hajn ..	OWH	—	Navy ..	600	O ^s ..	X	—	—	
Havnen ..	OWB	—	Navy ..	600	O ^s ..	X	—	—	
Havhesten ..	OWI	—	Navy ..	600	O ^s ..	X	—	—	
Havkatten ..	OWT	—	Navy ..	600	O ^s ..	X	—	—	
Havmanden ..	OVE	—	Navy ..	600	O ^s ..	X	—	—	
Havnen ..	OWJ	—	Navy ..	600	O ^s ..	X	—	—	
H. C. Orsted ²	OZK	100	Det Store Nodiske Teleg... Navy ..	300, 600	P ..	X	—	—	
Heimdal ..	OZJ	200	Det Forenede Dampskibsselskab	300, 600	P G ..	N ..	0.40	4.00	
Helvig Olav ¹	OZB	—	Navy ..	600	O ^s ..	X	—	—	
Herluf Trolle ..	OZH	—	Navy ..	600	O ^s ..	X	—	—	
Hjalperen ..	OUG	—	Navy ..	600	O ^s ..	X	—	—	
Hvarossen ..	OVH	150	Navy ..	600	O ^s ..	X	—	—	
I.C. La Cour ¹	OVL	100	Det Forenede Dampskibsselskab	300, 600	P G ..	X	0.40	4.00	
Island ¹ ..	OWK	100	Det Forenede Dampskibsselskab	300, 600	P G ..	X	0.40	4.00	
Ingløf ..	OYZ	250	Det Forenede Dampskibsselskab	300, 600	P ..	X	—	—	
Islands Falk ..	OUI	250	Det Ostasiatisk Co. ..	300, 600	O ^s ..	X	—	—	
Jutlands ²	OZG	250	Det Ostasiatisk Co. ..	300, 600	P ..	X	—	—	
Libau ³	OYG	250	Det Ostasiatisk Co. ..	300, 600	P G ..	X	—	—	
Løsen ..	OUL	—	Navy ..	600	O ^s ..	X	—	—	
Løvenørn ..	OUN	100	Government ..	300, 600	P G ..	X	—	—	
						0700 to 1100 1500 to 1900	—	—	
Makrelen ..	OWM	—	Navy ..	600	O ^s ..	X	—	—	
Minckran V ..	OWO	—	Navy ..	600	O ^s ..	X	—	—	
Minckran VI ..	OWP	—	Navy ..	600	O ^s ..	X	—	—	
Mitau ² ..	OWX	200	Det Ostasiatisk Compagnie	300, 600	P ..	X	—	—	
Najaden ..	OVN	—	Navy ..	600	O ^s ..	X	—	—	

Ship Stations—Continued.

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
DENMARK—contd.									
T. 8	OWN	—	Navy	600	O ^s	X	—	—	
Thetis OVI	OVI	—	Navy	600	O ^s	X	—	—	
Thor OWY	OWY	160	Navy	600	O ^s	X	—	—	
Tongking ¹	OZP	—	Det Ostasiatisk Co.	300, 800	P	X	—	—	
Triton OVP	OVP	—	Navy	600	O ^s	X	—	—	
Tunlaren	OVT	—	Navy	600	O ^s	X	—	—	
United States OZD ¹	OZD	200	Det Forenede Dampskib.	300, 800	P G	X	—	—	
Valkyrien OUV	OUV	—	Navy	600	O ^s	X	—	—	
Valkyrien	OXY	100	Em. Z. Svitzers Bjerg-Entreprise	300, 800	P	X	—	—	
Viking OZH ¹	OZH	160	Em. Z. Svitzers Bjerg-Entreprise	300, 800	P	X	—	—	
Vindubunden	OVV	—	Navy	600	O ^s	X	—	—	
Yokolama	OGA	250	Det Oversiske Co.	300, 450, 800	P	X	—	—	
DUTCH EAST INDIES									
Barentsz ¹	PMI	250	Kon. Paketvaart Mij.	300, 800	P G	N ¹	4.00	4.00	¹ Operated by the Société Anon. Internationale de T.S.F. Brussels
De Greve ¹	PMF	200	Koninklijke Paketvaart Mij.	300, 800	P G	—	4.00	4.00	² Public correspondence admitted without ship's charge when there is no official correspondence
Hercules PLG ¹	PLG	60	Navy	300, 800	O ^s	—	—	—	³ Operated by the Nederlandsche Telegraaf Co., Amsterdam.
Houtman ¹	PMC	200	Kon. Paketvaart Mij.	300, 800	P G	—	—	—	0400 to 0415, 0600 to 1800, 0900 to 1200, 1400 to 1800, 1700 to 1900, 2200 to 2300, 2400 to 2500
India PLU	PLU	400	N.V. Insulinde Tank S.S. Co.	300, 800	P G	—	—	—	⁴ Mean time of Java
Junco ¹	PKW	150-200	Nederlandsch Indische Tank S.S. Co.	—	—	—	—	—	
Koeteil ¹	PLC	100	Navy	300, 800	O ^s	—	—	—	
Lara ¹	PLV	100-150	Ned. Ind. Tankstoomboot Mij.	300, 800	P G	X	—	—	
Le Maire ¹	PMQ	150	Koninklijke Paketvaart Mij.	300, 800	P G	—	—	—	
PLV	PLV	60	Navy	300, 800	O ^s	—	—	—	
PLV	PLV	200	Kon. Paketvaart Mij.	300, 800	P G	—	—	—	
PLV	PLV	200	Kon. Paketvaart Mij.	300, 800	P G	—	—	—	
PLV	PLV	150-200	Kon. Paketvaart Mij.	300, 800	P G	—	—	—	
PLV	PLV	100-150	Kon. Paketvaart Mij.	300, 800	P G	—	—	—	

Siberg ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Siboga ¹	60	Navy	300, 600	O	..	4.00
Sloet van de Belle ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Sumbawa	60	Navy	300, 600	O ¹	..	..
Telegraaf	360	Government (Cable Ship)	300, 600, 1000	O	..	..
Tikobang ¹	100-120	Java, China, Japan Line	300, 600	P G	..	0.10
Tikobang ¹	200	Java, China, Japan Line	300, 600	P G	..	0.40
Tikobang ¹	100-200	Java, China, Japan Line	300, 600	P G	..	0.40
Tilatjap ¹	150	Java, China, Japan Line	300, 600	P G	..	0.40
Tiluwong ¹	150-200	Java, China, Japan Line	300, 600	P G	..	0.40
Timanoeek ¹	200	Java, China, Japan Line	300, 600	P G	..	0.40
Tipanas ¹	150	Java, China, Japan Line	300, 600	P G	..	0.40
Tisalak ¹	150-200	Java, China, Japan Line	300, 600	P G	..	0.40
Tisonari ¹	200	Java, China, Japan Line	300, 600	P G	..	0.40
Titaroen ¹	200	Java, China, Japan Line	300, 600	P G	..	0.40
Tydenan	60	Navy	300, 600	O ¹	..	..
Van Cloon	100-150	Kon. Paketvaart Mij.	300, 450, 600	P G	..	0.40
Van der Hagen	100	Kon. Paketvaart Mij.	300, 600	P G	..	4.00
Van Doorn	60	Navy	300, 600	O ¹	..	..
Van Heenskerk ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Van Imhoff ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Van Linschoten ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Van Rees ¹	200	Koninklijke Paketvaart Mij.	300, 600	P G	..	4.00
Van Overstraeten	200	Kon. Paketvaart Mij.	300, 600	P G	..	4.00
Van Spilbergen	100-150	Kon. Paketvaart Mij.	300, 600	P G	..	4.00
Zeeland	60	Navy	300, 600	O ¹	..	..
Abdel Moneim	162	Government	300, 600	O ¹	..	..
Aida ¹	162	Government	300, 600	O ¹	..	..
Mahroussa	350	Government	300, 600	P	..	..
Abda ¹	200	Cie de Navigation Paquet	300, 600	P G	..	0.40
Actif ¹	200	Cie Generale Transatlant.	300, 600	P G	..	0.10
Aden ¹	—	Navy	—	P G	..	0.05
	—	Cie des Chargeurs Reunis	—	P G	..	0.40

¹ This station is also open for urgent calls.¹ Operated by Cie d'Exploitation Radio-Electique, Paris
² Operated by the owner

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
FRANCE—contd.							Franks.	Franks.	
Afrique FCR ..	FCR	Day 270 night 1,080	Cie des Chargeurs Reunis	300, 600	P G ..	—	0.40	—	³ Cable ship ⁴ Ship engaged in a regular service between Calais and Dover
Afrique II ..	FHA	—	Poret-Lobez & Cie	—	P G ..	X	0.40	—	⁵ Ship engaged in a regular service between Dieppe and Newhaven
Agile ..	FBG	—	Navy ..	300, 600	P G ..	N	0.05	—	⁶ Ship engaged in a regular service, between France and Algeria
Aigle ..	FBWA	—	Navy ..	300, 600	P G ..	N	0.05	—	⁷ Ship engaged in a regular service between France, Algeria and Tunis
Ailette ..	FBPA	—	Navy ..	300, 600	P G ..	N	0.05	—	⁸ Ship engaged in a regular service between France and Corsica
Aisne ..	FBAI	—	Navy ..	300, 600	P G ..	N	0.05	—	⁹ Ship engaged in a regular service between France, Corsica and Algeria
Albatros ..	FALB	—	Navy ..	300, 600	P G ..	N	0.05	—	¹⁰ Ship engaged in a regular service between France and Tunis
Albertgalus ¹ ..	UHH	200	Soc. Mar. et Comm. du Pacifique	300, 600	P G ..	X	0.40	—	¹¹ Ship engaged in a regular service between France and Tunis
Aldebaran ..	FALD	—	Navy ..	300, 600	P G ..	N	0.05	—	¹² Private yacht
Alerte ..	FBLA	—	Navy ..	300, 600	P G ..	N	0.05	—	¹³ Operated by the Société Independente de T.S.F.
Algérie ..	FYG	—	Cie de Bateaux de Vapeur du Nord	—	P G ..	X	0.40	—	
Algérien ..	FBAG	—	Navy ..	300, 600	P G ..	N	0.05	—	
Algol ..	FBGL	—	Navy ..	300, 600	P G ..	N	0.05	—	
Alsace ² ..	FVK	200	Sté Gén de Transports Mari. à Vapeur	300, 600	P G ..	N	0.40	—	
Altair ..	FBLT	—	Navy ..	300, 600	P G ..	X	0.05	—	
Alumine ² ..	FWI	—	Cie F. de Marine et de Commerce	—	P G ..	X	0.40	—	
Alycon ¹ ..	UHC	200	Bourgain Bourgain	300, 600	P G ..	X	0.40	—	
Amazon ¹ ..	FMZ	300	Cie de Messageries Maritimes	300, 600	P G ..	X	0.40	—	
Amérique ¹ ..	FMX	150	Poret-Lobez et Cie.	300, 600	P G ..	X	0.40	—	
Amiens ..	FAMI	—	Navy ..	300, 600	P G ..	N	0.05	—	
Amiral-Aube ..	FAGB	—	Navy ..	300, 600	P G ..	N	0.05	—	
Amiral-Duperré ¹ ..	FCE	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Fourichon ¹ ..	FCF	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Ganteaume ¹ ..	FCI	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Jauréguiberry ¹ ..	FCI	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Latouche-Tréville ¹ ..	FCI	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Nielly ..	FCX	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Ponty ..	FCY	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Rizault de Genouille ¹ ..	FCG	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Sallandrouze de Lamornaix ¹ ..	FCL	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Froude ¹ ..	FCT	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	
Amiral-Villaret-Joyeuse ¹ ..	FCV	250	Compagnie des Chargeurs Reunis	300, 600	P G ..	N	0.40	—	

Amphitrite	FAPH	150	Navy	300, 600	P G	..	0.05
Anatolie ¹	FPA	300	Cie de Navigation Paquet	300, 600	P G	..	0.40
Ancre	FBNC	—	Navy	300, 600	P G	..	0.05
André	HTD	—	Soc. Les Affreteurs Reunis	—	—	..	—
André Lebon ¹	FNG	300	Compagnie des Messageries Maritimes	300, 600	P G	..	0.40
André Pierré	FWV	200	Acher, Duhamel & Gournay	300, 600	P G	..	0.40
Andronaque	FADR	—	Navy	300, 600	P G	..	0.05
Angers	FZE	—	State Rlys. Administration	—	P G	..	0.15
Anglet ¹	FLK	—	Cie des Chargeurs Français Plisson et Cie	—	P G	..	0.40
Ango ¹	FCP	250	Cie des Chargeurs Reunis..	300, 600	P G	..	0.40
Angoulême ¹	FRG	200	Sté Maritime Auxil. de Transport	300, 600	P G	..	0.40
Annamite	FBAM	—	Navy	300, 600	P G	..	0.05
Annibal	FBAN	—	Navy	300, 600	P G	..	0.05
Antarès	FBMA	—	Navy	300, 600	P G	..	0.05
Antigone FANI	FANI	—	Navy	300, 600	P G	..	0.05
Antilles	FOX	—	Cie Gen. Transatlantique	—	P G	..	0.40
Antiope	FATP	—	Navy	300, 600	P G	..	0.05
Antoinette ¹	FHO	—	V. Fourny	—	P G	..	0.40
Apache FBAP	FBAP	—	Navy	300, 600	P G	..	0.05
Apache FVP ¹¹	FVP	150	H. Legru	300	P	..	—
Apollon	FRL	—	Soc. Les Affreteurs Reunis	—	—	..	0.40
Aquitaine	FAA	—	Sté Gén. de Transp. Mar. à Vapeur	—	—	..	—
Arabe	FBRA	—	Navy	300, 600	P G	..	0.05
Arbalète	FBAE	—	Navy	300, 600	P G	..	0.05
Arche ¹	FOA	160	Cie Gén. Transatlantique	300, 600	P G	..	0.40
Arden	FBAR	—	Navy	300, 600	P G	..	0.05
Aréthuse	FATH	—	Navy	300, 600	P G	..	0.05
Ariane	FYI	150	—	300, 600	P G	..	0.40
Armand-Béhic ¹	FMB	300	Compagnie des Messageries Maritimes	300, 600	P G	..	0.40
Arménie ¹	FPR	200	Cie de Navigation Paquet	300, 600	P G	..	0.40
Arras	FBXA	—	Navy	300, 600	P G	..	0.05
Arriluze	UBS	—	Soc. de Welladorid-Bilbao	—	—	..	—
Asie FCA ¹	FCA	250	Cie des Chargeurs Reunis	300, 600	P G	..	0.40
Asie FHI ¹	FHI	250	Poret, Lobez & Cie.	300, 600	P G	..	0.05
Aspirant-Herber	FBHR	—	Navy	300, 600	P G	..	0.40
Aster FPT ¹	FPT	—	Cie de Navigation Paquet	—	—	..	—
Astrée FASR	FASR	—	Navy	300, 600	P G	..	0.05
Astrée FWS	FWS	80	Soc. Nav. Caennaise	300, 600	P G	..	0.40
Atalante	FANT	—	Navy	300, 600	P G	..	0.05
Athlète FATL	FATL	—	Navy	300, 600	P G	..	0.40
Athlète FQU ¹	FQU	300	Cie Gén. Transatlantique	300, 600	P G	..	0.40
Atbos	FMB	300	Cie des Messageries Maritimes	300, 600	P G	..	0.40
Atlantique ¹	FMT	300	Cie des Messageries Maritimes	300, 600	P G	..	0.40
Atman ¹¹	FYA	200	Baron E. de Rothschild	300, 600	P G	..	—
Aube ¹	FGV	—	Cie Gén. Transatlantique	—	—	..	—
Audaceuse	FBKD	—	Navy	300, 600	P G	..	0.40
Audaigny ¹	FSA	200	Cie des Chargeurs Reunis..	300, 600	P G	..	0.05
Aurochs	FARH	—	Navy	300, 600	P G	..	0.40
Autonne ¹	FHU	200	Delpiere et Fils	300, 600	P G	..	0.05
Aventurier	FBAV	—	Navy	300, 600	P G	..	0.05
Baccarat FBAC	FBAC	—	Navy	300, 600	P G	..	0.05
Bacchante ¹¹	FYB	150	Henri Menier	300, 600	P G	..	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.									
Bagdad FMY ¹ ..	FMY	300	Cie des Messageries Maritimes ..	300, 800	P G	N	Frans.	—	
Baleines (Les) ¹ ..	FBL	200	Cie des Pêcheries Mar. de l'Atlantique	300, 800	P G	X	0.40	—	
Balny ..	FABN	—	Navy ..	300, 800	P G	N	0.05	—	
Bambara ..	FBNR	—	Navy ..	300, 800	P G	N	0.05	—	
Baoulé ¹ ..	FBO	—	Cie des Chargeurs Reunis ..	—	P G	N	0.40	—	
Bapaume ..	FBBM	—	Navy ..	300, 800	P G	N	0.05	—	
Bar-le-Duc ..	FBLD	—	Navy ..	300, 800	P G	N	0.05	—	
Basque ¹ ..	FBU	250	Cie des Messageries Maritimes ..	300, 800	P G	N	0.40	—	
Bassee-Terre ¹ ..	FOE	250	Cie Gen. Transatlantique	300, 800	P G	N	0.40	—	
Batailleuse ..	FBAI	—	Navy ..	300, 800	P G	N	0.05	—	
Belfort FABL ..	FABL	—	Navy ..	300, 800	P G	N	0.05	—	
Bélier ..	FBLE	—	Navy ..	300, 800	P G	N	0.05	—	
Belatrix FBET ..	FBEI	—	Navy ..	300, 800	P G	N	0.05	—	
Belle-Isle ¹ ..	FSI	200	Cie des Chargeurs Reunis ..	300, 800	P G	N	0.40	—	
Belgiqueuse ..	FBIQ	—	Navy ..	300, 800	P G	N	0.05	—	
Bellone ..	FABO	—	Navy ..	300, 800	P G	N	0.05	—	
Béthune ..	FABE	—	Navy ..	300, 800	P G	N	0.05	—	
Bien-Hoa ..	FABH	—	Navy ..	300, 800	P G	N	0.05	—	
Biskra ¹ ..	FGA	250	Cie Gén. Transatlantique..	300, 800	P G	N	0.10	—	
Bisson FBIS ..	FBIS	—	Navy ..	300, 800	P G	N	0.05	—	
Bisson FBX ¹ ..	FBX	200	Cie Lorientaise de Chalutage	300, 800	P G	X	0.40	—	
Blais ¹ ..	FRD	200	Soc. Mar. aux de Transports	300, 800	P G	X	0.40	—	
Boeuf ..	FAOB	—	Navy ..	300, 800	P G	N	0.05	—	
Bordeaux FRD ¹ ..	FKD	—	Soc. Mar. aux de Transports	—	P G	X	0.40	—	
Bordeaux FZG ¹ ..	FZG	70	State Railway Administration	300, 800	P G	X	0.15	3.50	
Borée ..	FAOB	—	Navy ..	300, 800	P G	N	0.05	—	
Bosphore ¹ ..	FIB	300	Cie des Messageries Maritimes	300, 800	P G	N	0.40	—	
Boudier ..	FBOU	—	Navy ..	300, 800	P G	N	0.05	—	
Boufenne ..	FBOF	—	Navy ..	300, 800	P G	N	0.05	—	
Bougainville ¹ ..	FCB	200	Soc. Mar. aux. de Transports	300, 800	P G	N	0.40	—	
Bourges ¹ ..	FRK	2 00	Navy ..	300, 800	P G	N	0.05	—	
Bout-Dehors ..	FABR	—	Navy ..	300, 800	P G	N	0.05	—	
Brave ..	FAWB	—	State Railway Administration	300, 800	P G	X	0.15	3.50	
Brest ¹ ..	FZC	—	Navy ..	—	P G	N	0.05	—	
Bretagne FAHB ..	FAHB	—	Cie des Messageries Maritimes	300, 800	P G	N	0.40	—	
Bretagne FSB ¹ ..	FSB	250	—	300, 800	P G	N	0.05	—	
Breton ¹ ..	FIN	—	Cie des Messageries Maritimes	—	P G	N	0.40	—	

Britannia FJG ¹ ..	FJG	200	Clef.de Nav. à Vap. Cyprien Fabre & Cie	300, 600	N	0.40
Brunaire	FARV	—	Navy	300, 600	P	0.05
Buttle	FBUL	—	Navy	300, 600	P	0.05
C. 1 FAPQ	FAPQ	—	Navy	300, 600	P	0.05
C. 2 FASJ	FASJ	—	Navy	300, 600	P	0.05
C. 4 FBPY	FBPY	—	Navy	300, 600	P	0.05
C. 5	FBRW	—	Navy	300, 600	P	0.05
C. 6	FAPW	—	Navy	300, 600	P	0.05
C. 7	FBVZ	—	Navy	300, 600	P	0.05
C. 8	FBVZ	—	Navy	300, 600	P	0.05
C. 9	FBVZ	—	Navy	300, 600	P	0.05
C. 10	FADW	—	Navy	300, 600	P	0.05
C. 11	FADW	—	Navy	300, 600	P	0.05
C. 12	FBWX	—	Navy	300, 600	P	0.05
C. 13	FBPK	—	Navy	300, 600	P	0.05
C. 14	FBTK	—	Navy	300, 600	P	0.05
C. 15	FBOW	—	Navy	300, 600	P	0.05
C. 16	FBOW	—	Navy	300, 600	P	0.05
C. 17	FARL	—	Navy	300, 600	P	0.05
C. 18	FARL	—	Navy	300, 600	P	0.05
C. 19	FBQJ	—	Navy	300, 600	P	0.05
C. 20	FBUH	—	Navy	300, 600	P	0.05
C. 21	FBVX	—	Navy	300, 600	P	0.05
C. 22	FAOS	—	Navy	300, 600	P	0.05
C. 23	FAVB	—	Navy	300, 600	P	0.05
C. 24	FABI	—	Navy	300, 600	P	0.05
C. 25	FAZS	—	Navy	300, 600	P	0.05
C. 26	FAUQ	—	Navy	300, 600	P	0.05
C. 27	FAZB	—	Navy	300, 600	P	0.05
C. 28	FAYU	—	Navy	300, 600	P	0.05
C. 29	FBRE	—	Navy	300, 600	P	0.05
C. 30	FAGW	—	Navy	300, 600	P	0.05
C. 31	FACJ	—	Navy	300, 600	P	0.05
C. 32	FBHD	—	Navy	300, 600	P	0.05
C. 33	FADS	—	Navy	300, 600	P	0.05
C. 34	FAGH	—	Navy	300, 600	P	0.05
C. 35	FAWO	—	Navy	300, 600	P	0.05
C. 36	FBMX	—	Navy	300, 600	P	0.05
C. 37	FBDJ	—	Navy	300, 600	P	0.05
C. 38	FBNW	—	Navy	300, 600	P	0.05
C. 39	FAMY	—	Navy	300, 600	P	0.05
C. 40	FARI	—	Navy	300, 600	P	0.05
C. 41	FAHI	—	Navy	300, 600	P	0.05
C. 42	FAUN	—	Navy	300, 600	P	0.05
C. 43	FASY	—	Navy	300, 600	P	0.05
C. 44	FASY	—	Navy	300, 600	P	0.05
C. 45	FBAB	—	Navy	300, 600	P	0.05
C. 46	FBAB	—	Navy	300, 600	P	0.05
C. 47	FBZJ	—	Navy	300, 600	P	0.05
C. 48	FAIK	—	Navy	300, 600	P	0.05
C. 49	FAPJ	—	Navy	300, 600	P	0.05
C. 50	FAPJ	—	Navy	300, 600	P	0.05
C. 51	FACU	—	Navy	300, 600	P	0.05
C. 52	FAKD	—	Navy	300, 600	P	0.05
C. 53	FALK	—	Navy	300, 600	P	0.05
C. 54	FAOU	—	Navy	300, 600	P	0.05
C. 55	FAOU	—	Navy	300, 600	P	0.05
C. 56	FAHZ	—	Navy	300, 600	P	0.05

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.							Frances.	Frances.	
C. 57	FATI	—	Navy	300, 600	P G	N	0.05	—	
C. 58	FAIW	—	Navy	300, 600	P G	N	0.05	—	
C. 59	FBVU	—	Navy	300, 600	P G	N	0.05	—	
C. 60	FAYW	—	Navy	300, 600	P G	N	0.05	—	
C. 61	FAUX	—	Navy	300, 600	P G	N	0.05	—	
C. 62	FAZH	—	Navy	300, 600	P G	N	0.05	—	
C. 63	FANX	—	Navy	300, 600	P G	N	0.05	—	
C. 64	FAYS	—	Navy	300, 600	P G	N	0.05	—	
C. 65	FAXL	—	Navy	300, 600	P G	N	0.05	—	
C. 66	FBNH	—	Navy	300, 600	P G	N	0.05	—	
C. 67	FBUD	—	Navy	300, 600	P G	N	0.05	—	
C. 68	FBOD	—	Navy	300, 600	P G	N	0.05	—	
C. 69	FBZQ	—	Navy	300, 600	P G	N	0.05	—	
C. 70	FBJU	—	Navy	300, 600	P G	N	0.05	—	
C. 72	FAKX	—	Navy	300, 600	P G	N	0.05	—	
C. 73	FBUD	—	Navy	300, 600	P G	N	0.05	—	
C. 74	FBVJ	—	Navy	300, 600	P G	N	0.05	—	
C. 75	FBQW	—	Navy	300, 600	P G	N	0.05	—	
C. 76	FBMZ	—	Navy	300, 600	P G	N	0.05	—	
C. 77	FAYG	—	Navy	300, 600	P G	N	0.05	—	
C. 78	FBAL	—	Navy	300, 600	P G	N	0.05	—	
C. 79	FAKN	—	Navy	300, 600	P G	N	0.05	—	
C. 80	FANW	—	Navy	300, 600	P G	N	0.05	—	
C. 81	FAOZ	—	Navy	300, 600	P G	N	0.05	—	
C. 82	FBIZ	—	Navy	300, 600	P G	N	0.05	—	
C. 83	FADK	—	Navy	300, 600	P G	N	0.05	—	
C. 84	FBDK	—	Navy	300, 600	P G	N	0.05	—	
C. 85	FBUX	—	Navy	300, 600	P G	N	0.05	—	
C. 87	FBUX	—	Navy	300, 600	P G	N	0.05	—	
C. 88	FBGW	—	Navy	300, 600	P G	N	0.05	—	
C. 89	FBID	—	Navy	300, 600	P G	N	0.05	—	
C. 90	FBKZ	—	Navy	300, 600	P G	N	0.05	—	
C. 91	FBDQ	—	Navy	300, 600	P G	N	0.05	—	
C. 92	FBQL	—	Navy	300, 600	P G	N	0.05	—	
C. 93	FBTV	—	Navy	300, 600	P G	N	0.05	—	
C. 94	FBMZ	—	Navy	300, 600	P G	N	0.05	—	
C. 95	FBMD	—	Navy	300, 600	P G	N	0.05	—	
C. 96	FAIV	—	Navy	300, 600	P G	N	0.05	—	

C. 97	FBZW	—	Navy	..	..	300, 600	P G	..	N	0.05
C. 98	FBQK	—	Navy	..	..	300, 600	P G	..	N	0.05
C. 99	FBVP	—	Navy	..	..	300, 600	P G	..	N	0.05
Cactus	FBJC	—	Navy	..	..	300, 600	P G	..	N	0.05
Calais	FBCA	—	Navy	..	..	300, 600	P G	..	N	0.05
Californie ¹	FTK	250	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
Cambrai ⁵	FYC	—	State Railway Administration	..	..	—	P G	..	X	3.50
Cambria	FBTC	—	Navy	..	..	300, 600	P G	..	N	0.15
Campinas FCS ¹	FCS	200	Cie des Chargeurs Réunis	..	..	300, 600	P G	..	N	0.05
Canada FJC ¹	FJC	250	Cie f. de Nav. à Vap. Cyprien Fabre & Cie	..	..	300, 600	P G	..	N	0.40
Canard	FAUC	—	Navy	..	..	300, 600	P G	..	N	0.05
Cantal ¹	FCG	200	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
Cap Fagnon ¹	FCB	200	Soc. les Pêcheries de Fécamp	..	..	300, 600	P G	..	N	0.40
Capitaine Faure ¹	FMP	600	Cie des Messageries Maritimes	..	..	300, 600	P G	..	N	0.40
Capitaine-Méhl	FBYC	—	Navy	..	..	300, 600	P G	..	N	0.05
Capricieuse	FBGZ	—	Navy	..	..	300, 600	P G	..	N	0.05
Carabe ¹	FOC	—	Cie Gén. Transatlantique	..	..	—	P G	..	N	0.40
Caravellas ¹	FOK	200	Cie des Chargeurs Réunis	..	..	300, 600	P G	..	N	0.40
Caravelle ¹	FTC	250	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
Carmen FAC ¹	FAC	—	Cie France-Atlantique	..	..	—	P G	..	X	0.40
Carol I ¹	FYH	—	L. Dreyfus & Cie.	..	..	—	P G	..	X	0.40
Caroline FTO ¹	FTO	250	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
Caroubier	FBCR	—	Navy	..	..	300, 600	P G	..	N	0.05
Carquois ¹	FBCH	—	Navy	..	..	300, 600	P G	..	N	0.05
Casque	FBCQ	—	Navy	..	..	300, 600	P G	..	N	0.05
Cassard	FASD	—	Navy	..	..	300, 600	P G	..	N	0.05
Cassiopee	FBIO	—	Navy	..	..	300, 600	P G	..	N	0.05
Caucase ¹	FC	250	Cie des Messageries Maritimes	..	..	300, 600	P G	..	N	0.40
Cavaller ¹	FBV	—	Navy	..	..	300, 600	P G	..	N	0.05
Cédre	FAHC	—	Navy	..	..	300, 600	P G	..	N	0.05
Centaure	FACE	—	Navy	..	..	300, 600	P G	..	N	0.05
Cerbère	FARB	—	Navy	..	..	300, 600	P G	..	N	0.05
Ceylan ¹	FCG	300	Cie des Chargeurs Réunis	..	..	300, 600	P G	..	N	0.40
Chamois	FACH	—	Navy	..	..	300, 600	P G	..	N	0.05
Champlain FBCH	FBCH	—	Navy	..	..	300, 600	P G	..	N	0.05
Champlain FSP ¹	FSP	200	Cie des Chargeurs Réunis	..	..	300, 600	P G	..	N	0.40
Charles Roux ¹	FGR	200	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.10
Charlotte ¹	FHC	150	A. et G. Vidor Fils	..	..	300, 600	P G	..	X	0.40
Charue	FAMC	—	Navy	..	..	300, 600	P G	..	N	0.05
Chassiron ¹	FBN	200	Cie des Pêcheries Maritimes de l'Atlantique	..	..	300, 600	P G	..	X	0.40
Château-Latour	FWT	—	Worms et Cie, Paris	..	..	—	P G	..	X	0.40
Château-Palmer	FWR	200	Worms et Cie, Paris	..	..	300, 600	P G	..	X	0.40
Chateaufrenault	FACR	—	Navy	..	..	300, 600	P G	..	N	0.05
Chêne	FACQ	—	Navy	..	..	300, 600	P G	..	N	0.05
Chicago FTI ¹	FTI	300	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
Chili ¹	FMC	300	Cie des Messageries Maritimes	..	..	300, 600	P G	..	N	0.40
Cimetière	FBGM	—	Navy	..	..	300, 600	P G	..	N	0.05
Circassie ¹	FC	200	N. Paquet et Cie	..	..	300, 600	P G	..	N	0.40
Clameur	FACM	—	Navy	..	..	300, 600	P G	..	N	0.05
Claymore	FBWM	—	Navy	..	..	300, 600	P G	..	N	0.05
Clémante	FACI	—	Navy	..	..	300, 600	P G	..	N	0.05
Clorinde	FACL	—	Navy	..	..	300, 600	P G	..	N	0.05
Costlognon	FBCT	—	Navy	..	..	300, 600	P G	..	N	0.05

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.									
Cognée ..	FBUC	—	Navy	300, 600	P G	N	Francs.	—	
Colmar ..	FDR	—	Cie les Armateurs Français, Paris	—	P G	X	0.05	—	
Colonbe ..	FBEO	—	Navy	300, 600	P G	X	0.40	—	
Colonel Driant ..	FDE	—	Puech Fils ..	—	P G	X	0.05	—	
Commandant Bory ..	FBRY	—	Navy	300, 600	P G	X	0.05	—	
Commandant Doris ..	FIS	—	Cie des Messageries Maritimes ..	—	P G	N	0.40	—	
Commandant Lucas ..	FBEL	—	Navy	300, 600	P G	N	0.05	—	
Commandant Riviere ..	FBRI	—	Navy	300, 600	P G	N	0.05	—	
Condé FACX ..	FACX	—	Navy	300, 600	P G	N	0.05	—	
Condé FLD ..	FLD	200	Cie Havraise Péninsulaire de Nav. à Vapeur	300, 600	P G	N	0.40	—	
Condorcet ..	FANC	—	Navy	300, 600	P G	N	0.05	—	
Conquérante ..	FBEC	—	Navy	300, 600	P G	N	0.05	—	
Coq FACQ ..	FACQ	—	Navy	300, 600	P G	N	0.05	—	
Coquelicot ..	FATC	—	Navy	300, 600	P G	N	0.05	—	
Corailière ..	FMR	300	Cie des Messageries Maritimes ..	300, 600	P G	N	0.05	—	
Cornette ..	FWC	—	Delmas Frères ..	—	P G	X	0.40	—	
Corsica ..	FRC	200	Fraissinet & Cie ..	300, 600	P G	N	0.10	—	
Corte II ..	FRT	200	Fraissinet & Cie ..	300, 600	P G	N	0.10	—	
Coubre (La) ..	FDB	100	Cie des Pêcheries Maritimes de l'Atlantique	300, 600	P G	X	0.40	—	
Coucy ..	FBGY	—	Navy	300, 600	P G	N	0.05	—	
Courageuse ..	FBGG	—	Navy	300, 600	P G	N	0.05	—	
Courbet ..	FACO	—	Navy	300, 600	P G	N	0.05	—	
Coutelas ..	FBZC	—	Navy	300, 600	P G	N	0.05	—	
Craonne FAON ..	FAON	—	Navy	300, 600	P G	N	0.05	—	
Craonne II ..	FDZ	—	Puech Fils ..	—	P G	X	0.05	—	
Crimée ..	FMK	250	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Curie ..	FAUR	—	Navy	300, 600	P G	N	0.05	—	
Curse ..	FBLC	—	Navy	300, 600	P G	N	0.05	—	
Cyclope ..	FACY	—	Navy	300, 600	P G	N	0.05	—	
Dahomey ..	FSD	—	Navy	300, 600	P G	N	0.05	—	
Danube FID ..	FID	250	Cie des Chargeurs Réunis	300, 600	P G	N	0.40	—	
Daphné FAPN ..	FAPN	—	Cie des Messageries Maritimes	300, 600	P G	N	0.05	—	
Décidée ..	FBGD	—	Navy	300, 600	P G	N	0.05	—	
Délaigneuse ..	FBGN	—	Navy	300, 600	P G	N	0.05	—	
Déhorter ..	FBDH	—	Navy	300, 600	P G	N	0.05	—	
Démocratie ..	FATE	—	Navy	300, 600	P G	N	0.05	—	
D'Entrecasteaux ..	FSE	—	Cie des Chargeurs Réunis	300, 600	P G	N	0.40	—	

Desair	FAXD	—	Navy	..	..	300, 600	P G	..	0.05
D'Estères	FAJE	—	Navy	..	..	300, 600	P G	..	0.05
Diana FAIN	FAIN	—	Navy	..	..	300, 600	P G	..	0.05
Diderot	FACD	—	Navy	..	..	300, 600	P G	..	0.05
Diligente	FBDL	—	Navy	..	..	300, 600	P G	..	0.05
Divatte 1	FAU	250	Cie Nantaise de Nav. à Vapeur	..	..	300, 600	P G	..	0.40
Divona 1	FSD	300	Cie de Nav. Sud-Atlantique	..	..	300, 600	P G	..	0.40
Docteur Pierre Benoit 1	FIK	—	Cie des Messageries Maritimes	..	..	600	P G	..	0.40
Dolphin FAOD	FAOD	—	Navy	..	..	300, 600	P G	..	0.05
Dorade	FADO	—	Navy	..	..	300, 600	P G	..	0.05
Dordogne	FAND	—	Navy	..	..	300, 600	P G	..	0.05
Dordart-de-Lagrée	FADL	—	Navy	..	..	300, 600	P G	..	0.40
Doukala 1	FPD	200	N. Paquet et Cie	..	..	300, 600	P G	..	0.40
Draa 1	FPZ	200	N. Paquet et Cie	..	..	300, 600	P G	..	0.40
Drôme 1	FQD	—	Cie Gén. Transatlantique	..	..	—	P G	..	0.40
Dubardien	FBDU	—	Navy	..	..	300, 600	P G	..	0.05
Duc d'Amale 1	FGD	250	Cie Gén. Transatlantique	..	..	300, 600	P G	..	0.10
Duc de Bragance 1	FGG	250	Cie Gén. Transatlantique	..	..	300, 600	P G	..	0.10
Du Chafault	FBDG	—	Navy	..	..	300, 600	P G	..	0.05
Du Chavla	FADC	—	Navy	..	..	300, 600	P G	..	0.05
Duc de die FBDK	FBDK	—	Navy	..	..	300, 600	P G	..	0.05
Doucouléic FBI 1	FBDK	—	Cie Lorientaise de Chalutage	..	..	300, 600	P G	..	0.40
Dugay-Trouin	FBDG	200	Navy	..	..	300, 600	P G	..	0.05
Dumbéa 1	FBDG	—	Cie des Messageries Maritimes	..	..	300, 600	P G	..	0.40
Dumont d'Urville	FND	300	Navy	..	..	300, 600	P G	..	0.40
Dunkerque	FBDV	—	Navy	..	..	300, 600	P G	..	0.05
Duperre	FADH	—	Navy	..	..	300, 600	P G	..	0.05
Du-Petit-Thouars	FADP	—	Navy	..	..	300, 600	P G	..	0.05
Dupleix FCD 1	FAPT	—	Cie des Chargeurs Réunis	..	..	300, 600	P G	..	0.40
Dupleix FIX 1	FIX	300	Cie des Messageries Maritimes	..	..	300, 600	P G	..	0.40
Dupuy-de-Lôme	FAUY	—	Navy	..	..	300, 600	P G	..	0.05
Edgar-Quinet	FADQ	—	Mory et Cie	..	..	300, 600	P G	..	0.40
Edith Cavell FHL 1	FHL	200	Cie F. des Câbles Télégraphiques	..	..	300, 600	P G	..	0.40
Edouard Jérôme 1	FZJ	250	Soc. les Affréteurs	..	..	300, 600	P G	..	0.05
Elen	FRS	150	Navy	..	..	300, 600	P G	..	0.40
Elisabeth Marie	FAXQ	150	Soc. Gén. d'Armement Maritime	..	..	300, 600	P G	..	0.40
Emile Baudot	FAK	250	Compagnie Générale de Radio-télégraphie	..	..	300, 600	P G	..	0.40
Emilie LD 1	FZK	—	Cie f. des Câbles Télégraphiques	..	..	—	P G	..	0.40
Emmanuel 1	FYN	200	Navy	..	..	300, 600	P G	..	0.40
Emporté	FBPO	—	Navy	..	..	300, 600	P G	..	0.05
Engageante	FBNT	—	Navy	..	..	300, 600	P G	..	0.05
Enseigne-Henry	FBFV	—	Navy	..	..	300, 600	P G	..	0.05
Enseigne-Roux	FBXR	—	Navy	..	..	300, 600	P G	..	0.05
Eole 1	FRE	—	Soc. les Affréteurs Réunis	..	..	—	P G	..	0.40
Epargès (Les)	FALE	—	Navy	..	..	300, 600	P G	..	0.05
Epernay	FBJE	—	Navy	..	..	300, 600	P G	..	0.05
Epieu	FBME	—	Navy	..	..	300, 600	P G	..	0.05
Epinal	FAQE	—	Navy	..	..	300, 600	P G	..	0.05
Equateur 1	FME	300	Cie des Messageries Maritimes	..	..	300, 600	P G	..	0.40
Érable	FBCE	—	Navy	..	..	300, 600	P G	..	0.05
Ernest	FARN	—	Navy	..	..	300, 600	P G	..	0.05
Ernest-Renan	FAHR	—	Navy	..	..	300, 600	P G	..	0.05
Eros FYS 1	FYS	150	Henri de Rothschild	..	..	300	P G	..	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
FRANCE—contd.									
Escout ..	FAZE	—	Navy	300, 600	P G	N	Francs.	—	
Escopette ..	FBQE	—	Navy	300, 600	P G	N	0.05	—	
Espagne FTE 1	FTE	300	Cie Gén. Transatlantique	300, 600	P G	N	0.05	—	
Espagne FVE 1	FVE	250	Cie Gén. des Transports Mar., à Vap.	300, 600	P G	N	0.40	—	
Espiègle FBEP	FBEP	—	Navy	300, 600	P G	N	0.05	—	
Étourdi ..	FBXE	—	Navy	300, 600	P G	N	0.05	—	
Eugène Grosos 1	FLG	150	Cie Havraise Péinsulaire de Nav. à Vap.	300, 600	P G	N	0.40	—	
Eugène Péreire 1	FGP	200	Cie Gén. Transatlantique..	300, 600	P G	N	0.10	—	
Euler ..	FAUL	—	Navy	300, 600	P G	N	0.05	—	
Euphrate FNE 1	FNE	300	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Europe FCU 1	FCU	300	Cie des Chargeurs Réunis..	300, 600	P G	N	0.40	—	
Europe FHN (L) 1	FHN	150	Port-Lobez & Cie.	300, 600	P G	N	0.40	—	
Éveillé ..	FBEV	—	Navy	300, 600	P G	N	0.05	—	
Faisan ..	FBAX	—	Navy	300, 600	P G	N	0.05	—	
Fanfare ..	FBIX	—	Navy	300, 600	P G	N	0.05	—	
Fantion ..	FBNI	—	Navy	300, 600	P G	N	0.05	—	
Fantastique ..	FAXV	—	Navy	300, 600	P G	N	0.05	—	
Faraday FARY	FARY	—	Navy	300, 600	P G	N	0.05	—	
Farouche ..	FAJV	—	Navy	300, 600	P G	N	0.05	—	
Faucou ..	FADY	—	Navy	300, 600	P G	N	0.05	—	
Fauconneau ..	FBKU	—	Navy	300, 600	P G	N	0.05	—	
Favori ..	FAHW	—	Navy	300, 600	P G	N	0.05	—	
Félix-Touache 1	FXF	200	Cie de Nav. Mixte à Vap.	300, 600	P G	N	0.05	—	
Fier ..	FBZY	—	Navy	300, 600	P G	N	0.05	—	
Finistère 1	FQF	—	Cie Gén. Transatlantique	—	P G	N	0.05	—	
Flamblant ..	FBKL	—	Navy	300, 600	P G	N	0.40	—	
Flandre FGF 1	FGF	300	Cie Gén. Transatlantique	300, 600	P G	N	0.05	—	
Flandre FKN	FKN	—	Cie des Chargeurs f. Plisson & Cie	300, 600	P G	N	0.40	—	
Flandre FVD	FVD	—	Soc. Gén. des Transports Maritime à Vap.	—	P G	N	0.40	—	
Forfait ..	FAOR	—	Navy	300, 600	P G	N	0.05	—	
Formosa FVF 1	FVF	250	Soc. Gén. des Transports Maritime à Vap.	300, 600	P G	N	0.40	—	
Formose 1	FSF	—	Cie des Chargeurs Réunis	—	P G	N	0.40	—	
Fort de Douaumont 1	FSU	200	Cie des Chargeurs Réunis	300, 600	P G	N	0.40	—	
Fort de Souville 1	FSS	200	Cie des Chargeurs Réunis	300, 600	P G	N	0.40	—	
Fort de Troyon 1	FSN	200	Cie des Chargeurs Réunis	300, 600	P G	N	0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
FRANCE—contd.							Francs.	Francs.	
Hamelin ..	FBHA	—	Navy ..	300, 800	P G	N	0.05	—	
Hardi	FBWH	—	Navy ..	300, 800	P G	N	0.05	—	
Harpon ..	FBZH	—	Navy ..	300, 800	P G	N	0.05	—	
Havraise ¹	FLH	150	Cie Havraise Péninsulaire de Nav. à Vap.	300, 800	P G	N	0.40	—	
Hendaye ..	FKY	—	Cie des Chargeurs f. Plisson & Cie	—	P G	N	0.40	—	
Henriette FBHI	FBHI	—	Navy ..	300, 800	P G	N	0.05	—	
Henriette FHH	FHH	150	A. & G. Vidor fils	300, 800	P G	N	0.40	—	
Henry-Fournier ..	FAHU	—	Navy ..	300, 800	P G	N	0.05	—	
Henry-Fraissinet ¹	FRH	—	Fraissinet & Cie ..	—	P G	N	0.40	—	
Hermione FAHO	FAHO	—	Navy ..	300, 800	P G	N	0.05	—	
Héron II ..	FBGH	—	Navy ..	300, 800	P G	N	0.05	—	
Héros ..	FAJH	—	Navy ..	300, 800	P G	N	0.05	—	
Hêtre ..	FBHT	—	Navy ..	300, 800	P G	N	0.05	—	
Hippopotame ..	FBHP	—	Navy ..	300, 800	P G	N	0.05	—	
Homard ..	FBHM	—	Navy ..	300, 800	P G	N	0.05	—	
Homécourt ..	FKH	—	Cie des Chargeurs f. Plisson & Cie	—	P G	N	0.40	—	
Honduras ¹	FTU	250	Cie Gén. Transatlantique	300, 800	P G	N	0.40	—	
Hova ..	FBHO	—	Navy ..	300, 800	P G	N	0.05	—	
Hudson ¹	FBHU	250	Cie Gén. Transatlantique	300, 800	P G	N	0.40	—	
Hussard ..	FBHU	—	Navy ..	300, 800	P G	N	0.05	—	
Hypolite Worms ..	FWY	—	Worms & Cie ..	300, 800	P G	N	0.40	—	
Ibéria ¹	FRB	200	Fraissinet & Cie ..	300, 800	P G	N	0.40	—	
Ile de France ¹	FVI	250	Soc. Gén. des Transports Maritimes à Vap.	300, 800	P G	N	0.10	—	
Ile de la Réunion ¹	FLN	150	Cie Havraise Péninsulaire de Nav. à Vap.	300, 800	P G	N	0.40	—	
Imérina ¹	FIM	250	Cie des Messageries Maritimes	300, 800	P G	N	0.40	—	
Impéteuse ..	FBJI	—	Navy ..	300, 800	P G	N	0.05	—	
Inca FBIK	FBIK	—	Navy ..	300, 800	P G	N	0.05	—	
Inconstant FBIC	FBIC	—	Navy ..	300, 800	P G	N	0.05	—	
Inés FBZ ¹	FHZ	200	Fourny & Cie ..	300, 800	P G	N	0.40	—	
Infatigable ..	FAXI	—	Navy ..	300, 800	P G	N	0.05	—	
Intrepide ..	FBWI	—	Navy ..	300, 800	P G	N	0.05	—	
Ionie ¹	FPO	200	N. Paquet & Cie ..	300, 800	P G	N	0.40	—	
Ipéca ..	FBQI	—	Navy ..	300, 800	P G	N	0.05	—	
Iroul-guy ..	FKI	—	Cie des Chargeurs f. Plisson & Cie	300, 800	P G	N	0.05	—	
Iskheul ..	FAVI	—	Navy ..	300, 800	P G	N	0.40	—	
Ispahan ¹	FIH	—	Cie des Messageries Maritimes	300, 800	P G	N	0.05	—	

Italie FVW	FVW	250	Soc. Gén. des Transports Maritimes	300, 800	P G	N	0.40
Jacques Cartier ¹	FTJ	300	Cie Gén. Transatlantique	300, 800	P G	X	0.40
Jacques-Cœur	FAJC	—	Navy	300, 800	P G	X	0.05
Jacques-Fraissinet ¹	FRI	200	Fraissinet & Cie	300, 800	P G	X	0.40
Jade ²	FVJ	—	Cie F. de Marine et de Commerce	—	P G	X	0.40
Jadot ¹	FVJ	—	N. Paquet & Cie	—	P G	X	0.40
Jean-Bart	FAGJ	—	Navy	300, 800	P G	X	0.05
Jeanne d'Arc FAMJ ¹	FAMJ	—	Navy	300, 800	P G	X	0.10
Jeanne d'Arc FQJ ¹	FQJ	—	Cie Gén. Transatlantique	—	P G	X	0.05
Jeanne et Geneviève	FAJG	—	Navy	300, 800	P G	X	0.40
Jeanne Marie ¹	FAM	150	Soc. fr. d'Armement	300, 800	P G	X	0.40
Jeannot ¹	FHJ	200	Fourny & Cie	300, 800	P G	X	0.05
Joessel	FAJO	—	Navy	300, 800	P G	X	0.05
Joyeuse	FBVJ	—	Navy	300, 800	P G	X	0.05
Jules-Ferry	FAJV	—	Navy	300, 800	P G	X	0.05
Jules-Michelet	FAJM	—	Navy	300, 800	P G	X	0.05
Jurien de la Gravière	FAJJ	—	Navy	300, 800	P G	X	0.05
Justice	FAJU	—	Navy	300, 800	P G	X	0.05
Kabyle	FBKY	—	Navy	300, 800	P G	X	0.05
Kantara (El) ¹	FNK	300	Cie des Messageries Maritimes	300, 800	P G	X	0.05
Kouang-Si ¹	FIG	200	Cie des Messageries Maritimes	300, 800	P G	X	0.40
Laboretux	FAIL	—	Navy	300, 800	P G	X	0.40
Labrador FVD ¹	FVD	—	Joseph Huret	—	P G	X	0.40
La Fayette ¹	EGE	300	Cie Gén. Transatlantique	300, 800	P G	X	0.05
La Fontaine ²	FWO	—	Deinas freres	—	P G	X	0.40
Lagrange	FALG	—	Navy	300, 800	P G	X	0.40
La Hire ¹	FBVH	—	Navy	300, 800	P G	X	0.05
Lamentin ¹	FQJL	—	Navy	300, 800	P G	X	0.05
Lamotte-Picquet	FAMP	—	Cie Gén. Transatlantique	—	P G	X	0.40
Lansquenot	FBLQ	—	Navy	300, 800	P G	X	0.05
Lantana	FBLN	—	Navy	300, 800	P G	X	0.05
La Pérouse ¹	FTD	300	Cie Gén. Transatlantique	300, 800	P G	X	0.40
Laperousse	FBLP	—	Navy	300, 800	P G	X	0.05
Lapeyrouse ¹	FWL	—	Cie Gén. Armement Maritime	—	P G	X	0.05
Laplace FALP	FALP	—	Navy	300, 800	P G	X	0.40
Lassigny	FBLS	—	Navy	300, 800	P G	X	0.05
Lavardin ¹	FBG	150	Compagnie Générale de Radiotélégraphie	300, 800	P G	X	0.05
Lavoisier	FAVO	—	Navy	300, 800	P G	X	0.05
Léopold L.D. ¹	FYL	350	L. Dreyfus & Cie	300, 800	P G	X	0.40
Le Verrier	FAVR	—	Navy	300, 800	P G	X	0.05
Liamone ²	FRA	150	Fraissinet & Cie	300, 800	P G	X	0.10
Liberia ¹	FIL	200	Cie F. de Marine et de Commerce	300, 800	P G	X	0.40
Lieutenant Missessy ¹	FIV	—	Cie des Messageries Maritimes	—	P G	X	0.40
Liévin	FALI	—	Navy	300, 800	P G	X	0.05
Liger ¹	FSL	300	Cie de Nav. Sud-Atlantique	300, 800	P G	X	0.40
Lillies ¹	FHP	400	Fourny & Cie	300, 800	P G	X	0.40
Limoges ¹	FAY	200	Soc. Mar. aux de Transports	300, 800	P G	X	0.04
Libella	FBLO	—	Navy	300, 800	P G	X	0.05
Loire (La) ¹	FAR	300	Cie Nantaise de Nav. a Vap.	300, 800	P G	X	0.40
Loret	FAOL	—	Navy	300, 800	P G	X	0.05
Lorraine FALN ¹	FALN	—	Navy	300, 800	P G	X	0.05
Lorraine FTL (La) ¹	FTL	300	Cie Gén. Transatlantique	300, 800	P G	X	0.40
Lotos ¹	FML	300	Cie des Messageries Maritimes	300, 800	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.									
Louis Fraissinet ¹	FRR	200	Fraissinet & Cie	300, 600	P G	X	Francs.	—	
Loup	FBOL	—	Navy	300, 600	P G			0.40	
Loup-Cervier	FBVL	—	Navy	300, 600	P G			0.05	
Lousoir ¹	FNL	300	Cie des Messageries Maritimes	300, 600	P G	N		0.05	
Lunville	FALU	—	Navy	300, 600	P G			0.40	
Luronne	FBLU	—	Navy	300, 600	P G	N		0.05	
Lutetia ¹	FST	300	Cie de Nav. Sud-Atlantique	300, 600	P G	N		0.05	
Luttetour	FAML	—	Navy	300, 600	P G	N		0.04	
Madonna ¹	FJM	200	Cie f. de Nav. à Vap. Cyprien Fabre & Cie	300, 600	P G	N		0.05	
Magon	FBTM	—	Navy	300, 600	P G			0.40	
Magny ¹	FWD	300	Gillet & fils.	300, 600	P G	X		0.05	
Mine FVM ^{1 6}	FVM	—	Soc. Gén. des Transports Mar. à Vapeur	—	P G	N		0.10	
Malicieuse	FBVM	—	Navy	300, 600	P G			0.05	
Malte ¹	FCM	300	Cie des Chargeurs Réunis	300, 600	P G	N		0.05	
Mameluck	FLMK	—	Navy	300, 600	P G	N		0.40	
Mammoth	FBMH	—	Navy	300, 600	P G	N		0.05	
Manche (La)	FVY	—	Soc. de l'Ecole Pratique de Pêche	—	P G	N		0.05	
Mangini	FBMG	—	Navy	300, 600	P G	X		0.40	
Maonba ^{1 7}	FXB	200	Cie de Nav. Mixte à Vap.	300, 600	P G	N		0.05	
Mansourah ^{1 7}	FXZ	150	Cie de Nav. Mixte à Vap.	300, 600	P G	N		0.10	
Marbre	FBM	—	Navy	300, 600	P G	N		0.10	
Marcellin	FBWM	—	Navy	300, 600	P G	N		0.05	
Maréchal Bugeaud ^{1 6}	FGY	200	Cie Gén. Transatlantique	300, 600	P G	N		0.10	
Margaux	FWX	—	Worms & Cie	300, 600	P G	X		0.40	
Marguerite VI	FAPM	—	Navy	—	P G	X		0.05	
Marguerite Marie ^{1 a}	FBO	200	Soc. la Pêche Française	—	P G			—	
Marguerite Marie II ¹	FBO	—	Soc. Nouvelle des Pêcheries à Vap.	300, 600	P G	X		0.40	
Marie Rose FHM ¹	FHM	150	A. & G. Vodor, Fils.	300, 600	P G	X		0.40	
Marie-Stella ¹	FHS	200	Fourny & Cie	300, 600	P G	X		0.40	
Marie FBH ¹	FBH	300	Soc. des Usines Métallurgiques de la Basse-Loire	300, 600	P G	X		0.40	
Marne FBZM	FBZM	—	Navy	300, 600	P G			—	
Maroc ¹	FYM	150	Joseph Huret	300, 600	P G	N		0.05	
Marocain	FBOC	—	Navy	300, 600	P G	X		0.05	
Marsa (La) ^{1 6}	FXR	200	Cie de Nav. Mixte à Vap.	300, 600	P G	X		0.40	
Marsillaise	FADM	—	Navy	300, 600	P G			0.05	
Martinique ¹	FTM	250	Cie Gén. Transatlantique	300, 600	P G	X		0.40	

Massue	FBMU	—	Navy	300, 600	P G	..	0.05	..
Mastodonte	FAMN	—	Navy	300, 600	P G	..	0.05	..
Mauritanie ¹	FVT	—	Joseph Huret	—	P G	..	0.40	..
Mauvette	FAOM	—	Navy	300, 600	P G	..	0.05	..
Mécanicien principal	FBJL	—	Navy	300, 600	P G	..	0.05	..
Lestin								
Mcg	FAGM	—	Navy	300, 600	P G	..	0.05	..
McJari	FBGM	—	Navy	300, 600	P G	..	0.05	..
McJann ¹	FMI	250	Cie des Messageries Maritimes	300, 600	P G	..	0.40	..
McJbourne FNM ¹	FNM	300	Cie des Messageries Maritimes	300, 600	P G	..	0.40	..
Meurthe ¹	FPO	—	N. Paquet & Cie	—	P G	..	0.40	..
Meuse	FBQM	—	Navy	300, 600	P G	..	0.05	..
Mexico FTX ¹	FTX	250	Cie Gén. Transatlantique	300, 600	P G	..	0.40	..
Michal et Rendée	FAUM	—	Navy	300, 600	P G	..	0.05	..
Milon	FAWM	—	Navy	300, 600	P G	..	0.05	..
Mingrèlie ¹	FPX	150	N. Paquet & Cie	300, 600	P G	..	0.40	..
Miquelon	FWM	100	Soc. de la Morue f. et Sécheries de Fécamp	300, 600	P G	..	0.40	..
Mis isippi ¹	FGI	160	Cie Gén. Transatlantique	300, 600	P G	..	0.40	..
Mistral	FBML	—	Navy	300, 600	P G	..	0.05	..
Mohican	FAMO	—	Navy	300, 600	P G	..	0.05	..
Moïse 17	FGS	200	Cie Gén. Transatlantique	300, 600	P G	..	0.10	..
Mondement	FBMO	—	Navy	300, 600	P G	..	0.05	..
Montcalm FAHM	FAHM	—	Navy	300, 600	P G	..	0.05	..
Mont-Cenis	FVC	200	Soc. Gén. des Transports Maritimes à Vap.	300, 600	P G	..	0.40	..
Mont Cervin	FVV	200	Soc. Gén. des Transports Maritimes à Vap.	300, 600	P G	..	0.40	..
Monte d'Oro ²	FDD	200	Soc. An. de Transport et de Pêche	300, 600	P G	..	—	..
Montgolfer	FAOM	—	Navy	300, 600	P G	..	0.05	..
Montjoie ¹	EDO	200	Soc. des Acieries de Paris et d'Outreau	300, 600	P G	..	0.40	..
Montmairil	FBMI	—	Navy	300, 600	P G	..	0.05	..
Mont-Pelvoux	FVX	200	Soc. Gén. des Transports Maritimes à Vap.	300, 600	P G	..	0.40	..
Mont-Ventoux ¹	FOM	150	Cie Gén. Transatlantique	300, 600	P G	..	0.40	..
Moqueuse	FBKM	—	Navy	300, 600	P G	..	0.05	..
Mortier	FBNM	—	Navy	300, 600	P G	..	0.05	..
Moulon ¹	FANM	—	Navy	300, 600	P G	..	0.05	..
Moulouya ¹	FXY	—	Cie de Nav. Mixte à Vap.	—	P G	..	0.10	..
Mustapha II ¹	FXM	200	Cie de Nav. Mixte à Vap.	300, 600	P G	..	0.10	..
Nancy	FBNA	—	Navy	300, 600	P G	..	0.05	..
Nantes ¹	FRX	—	Soc. Maritime aux de Transports	300, 600	P G	..	0.40	..
Narval	FAZN	—	Navy	300, 600	P G	..	0.05	..
Natal FMN ¹	FMN	300	Cie des Messageries Maritimes	300, 600	P G	..	0.40	..
Navarre ¹	FTN	250	Cie Gén. Transatlantique	300, 600	P G	..	0.40	..
Némésia	FBZN	—	Navy	300, 600	P G	..	0.05	..
Néra ¹	FNN	300	Cie des Messageries Maritimes	300, 600	P G	..	0.40	..
Nérède	FARI	—	Navy	300, 600	P G	..	0.05	..
Newhaven FZH ¹	FZH	150	State Railway Administration	300, 600	P G	..	0.15	..
Newton FAWT	FAWT	—	Navy	300, 600	P G	..	0.05	..
Niagara FTB ¹	FTB	300	Cie Gén. Transatlantique	300, 600	P G	..	0.05	..
Nicolas Norbert	FYK	—	Mory et Cie	—	P G	..	0.40	..
Nicolas Toussaint ¹	FYK	150	Cie des Messageries Maritimes	300, 600	P G	..	0.40	..
Nièvre (La) ¹	FGN	150	Cie Gén. Transatlantique	300, 600	P G	..	0.10	..

3.50

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.									
Nivernais	FVN	250	Soc. Gén. des Trans. Mar. à Vap.	300, 600	P G		Francs.	Francs.	
Nord 24	FZN	200	Cie des Chemin de fer du Nord	300, 600	P G	N	0.40	—	
Nord-Caper 1	FHD	150	Port-Lobez & Cie	300, 600	P G	N	0.15	—	
Normand	FMM	300	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Normandie 1	FBC	300	Soc. les Pêcheries de Fécamp	300, 600	P G	N	0.40	—	
Notre-Dame de la Mer 1	FZM	150	Soc. des Œuvres de Mer	300, 600	P G	N	0.40	—	
Notre-Dame de Lourds 1	FHB	150	Fourny & Co.	300, 600	P G	N	0.40	4.00	
Notre-Dame des Dunes 1	FVB	150	Christians & Bourgain Frères	300, 600	P G	N	0.40	—	
Notre-Damed'Espérance 1	FYE	150	Delpierre & Fils	300, 600	P G	N	0.40	—	
Noun 1	FVY	200	N. Paquet & Cie	300, 600	P G	N	0.40	—	
Nubidia 1	FRN	200	Fraissinet & Cie	300, 600	P G	N	0.40	—	
Obusier	FBOS	—	Navy	300, 600	P G	N	0.10	—	
O'Byrne	FABY	—	Navy	300, 600	P G	N	0.05	—	
Océan FVO 1	FNO	300	Armond Coppin	300, 600	P G	N	0.40	—	
Océanien 1	FBO	300	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Oise	FBQY	—	Navy	300, 600	P G	N	0.05	—	
Opiniâtre	FBOP	—	Navy	300, 600	P G	N	0.05	—	
Orage	FBIR	—	Navy	300, 600	P G	N	0.05	—	
Orégon FQR 1	FQR	150	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
Orenoque 1	FMO	250	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Orient UHB 1	UHB	200	Soc. f. des Pêcheries à Vap.	300, 600	P G	N	0.40	—	
Oriflamme	FBQO	—	Navy	300, 600	P G	N	0.05	—	
Orléans FRW 1	FRW	—	Soc. Mar. aux de Transports	300, 600	P G	N	0.40	—	
Orme	FBQN	—	Navy	300, 600	P G	N	0.40	—	
Orme 1	FQO	250	Cie Gén. Transatlantique	300, 600	P G	N	0.05	—	
Oudjda 17	FQO	—	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
Ouessant 1	FGW	300	Cie des Chargeurs Réunis	300, 600	P G	N	0.10	—	
Outreau 1	FDI	200	Soc. des Acieries de Paris et d'Outreau	300, 600	P G	N	0.40	—	
Oxus 1	FMX	300	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Pacifique 1	FNW	300	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—	
Paon	FBPN	—	Navy	300, 600	P G	N	0.05	—	
Paris FASP	FASP	—	Navy	300, 600	P G	N	0.05	—	
Pas-de-Calais 24	FZP	200	Cie du Chemin de Fer du Nord	300, 600	P G	N	0.15	—	
Patria FJP 1	FJP	200	Cie f. de Nav. à Vap Cyprien Fabre et Cie	300, 600	P G	N	0.40	—	
Paris	FAGP	—	Navy	300, 600	P G	N	0.05	—	
Paul-Chailey	FACP	—	Navy	300, 600	P G	N	0.05	—	

Pau Lezat ¹	FNP	300	Cie des Messageries Maritimes	Navy	300, 600	N	0.40
Peau-Rouge	FAPG	—	Navy	Navy	300, 600	N	0.05
Pet-Ho ¹	FMP	300	Cie des Messageries Maritimes	Navy	300, 600	N	0.40
Pellon t's	FRP	200	Fraissinet & Cie	Navy	300, 600	N	0.10
Peronne	FAPF	—	Navy	Navy	300, 600	N	0.05
Pérou ¹	FTP	250	Cie Gén. Transatlantique	Navy	300, 600	N	0.40
Persépolis ¹	FNV	300	Cie des Messageries Maritimes	Navy	300, 600	N	0.40
Pertusane	FBPE	—	Navy	Navy	300, 600	N	0.05
Pertuisier	FBPL	—	Navy	Navy	300, 600	N	0.05
Phocéen	FPI	150	S. A. Provençole de Remorquage	Navy	300, 600	N	0.40
Phrygie ¹	FPI	250	N. Paquet & Cie	Navy	300, 600	N	0.40
Pierre-Callot	FAPC	—	Navy	Navy	300, 600	N	0.05
Pierrier	FBPI	—	Navy	Navy	300, 600	N	0.05
Pigeon FAO ¹	FAOP	—	Navy	Navy	300, 600	N	0.05
Pinson I.	FBIP	—	Navy	Navy	300, 600	N	0.05
Pintade	FAYP	—	Navy	Navy	300, 600	N	0.05
Pioche	FAHP	—	Navy	Navy	300, 600	N	0.05
Pique	FBUP	—	Navy	Navy	300, 600	N	0.05
Plata FVL	FVL	250	Soc. Gén. des Transports Mar. à Vap.	Navy	300, 600	N	0.40
P.L.M. 7 ¹	UHR	200	Soc. Nat. d'Affrètements	Navy	300, 600	X	0.40
P.L.M. 8 ¹	UHS	200	Soc. Nat. d'Affrètements	Navy	300, 600	X	0.40
Pluton	FAPU	—	Navy	Navy	300, 600	N	0.05
Poirnard	FBKP	—	Navy	Navy	300, 600	N	0.05
Poitiers ^a	FZL	—	State Railways Administration	Navy	300, 600	X	0.15
Polyphème	EBI	—	Navy	Navy	300, 600	X	0.05
Pomrol	FWP	—	Worms & Cie	Navy	—	X	0.40
Pontet-Canet	FWN	—	Worms & Cie	Navy	—	X	0.40
Portos ¹	FMS	300	Cie des Messageries Maritimes	Navy	300, 600	X	0.40
Portsmouth EZY ^a	FZY	—	State Railways Administration	Navy	—	X	0.15
Portugal FVG	FVG	—	Soc. Gén. des Transports Mar. à Vap.	Navy	—	X	0.40
Pothuaux	FAPQ	—	Navy	Navy	300, 600	N	0.05
Pouyer-Quettier	FZT	300	Cie f. des Câbles Télégraphiques	Navy	600, 1,000	N	0.40
Prado	FBNP	—	Navy	Navy	300, 600	N	0.05
Président-Le-Roy-Lallier	FYO	—	Cie des Bateaux à Vap. du Nord	Navy	—	X	0.40
Primauguet	FBPG	—	Navy	Navy	300, 600	N	0.05
Protève	FAPR	—	Navy	Navy	300, 600	N	0.05
Protêt	FBPR	—	Navy	Navy	300, 600	N	0.05
Provence FABP	FAPB	—	Navy	Navy	300, 600	N	0.05
Provence FAP	FAP	200	Cie de Nav. France-Amérique	Navy	300, 600	N	0.40
Providence FJB ¹	FJB	300	Cie f. de Nav. à Vap. Cyprien Fabre	Navy	300, 600	N	0.40
Puerto-Rico ¹	FGU	250	Cie Gén. Transatlantique	Navy	300, 600	N	0.40
Quartz ^a	FWQ	—	Cie f. de Marine et de Commerce	Navy	—	X	0.40
Quantin-Rosevelt	FAQR	—	Navy	Navy	300, 600	N	0.05
Radioline ¹	FXN	150	Cie de Nav. Mixte à Vap.	Navy	300, 600	N	0.40
Rafale	FBRL	—	Navy	Navy	300, 600	N	0.05
Railleuse	FBZR	—	Navy	Navy	300, 600	N	0.05
Ramier	FBWR	—	Navy	Navy	300, 600	N	0.05
Râteau	FBVR	—	Navy	Navy	300, 600	N	0.05
Râteau	FATR	—	Navy	Navy	300, 600	N	0.05
Rebia ¹	FPI	—	N. Paquet & Cie	Navy	300, 600	N	0.40
Regnault	FAGL	—	Navy	Navy	300, 600	N	0.05
Régulus FBQR	FBQR	—	Navy	Navy	300, 600	N	0.05

Ship Stations—Continued

Remarks.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
FRANCE—contd.							Francs.	Francs.	
Reims ..	FBRE	—	Navy ..	300, 600	P G	N	0.05	—	
Remiremont ..	FBRM	—	Navy ..	300, 600	P G	N	0.05	—	
Renard ..	FBKN	—	Navy ..	300, 600	P G	N	0.05	—	
René ..	FBRN	—	Navy ..	300, 600	P G	N	0.05	—	
Renée ..	FAYL	—	Navy ..	300, 600	P G	N	0.05	—	
République ..	FAKR	—	Navy ..	300, 600	P G	N	0.05	—	
Résolue ^{2 12} ..	FVU	150	Pierre Lebaudy ..	300, 600	P G	N	—	—	
Revigny ..	FARV	—	Navy ..	300, 600	P G	N	0.05	—	
Rhinoceros ..	FBRH	—	Navy ..	300, 600	P G	N	0.05	—	
Rhône FALR ..	FALR	—	Navy ..	300, 600	P G	N	0.05	—	
Rhône FXH ^{1 7} ..	FXH	250	Cie de Nav. Mixte à Vap. ..	300, 600	P G	N	0.05	—	
Ribeauville ¹ ..	FDV	150	Soc. des Armateurs l. ..	300, 600	P G	N	0.10	—	
Rigel FVT ⁵ ..	FVT	250	Soc. Gén. des Transports Mar. à Vap. ..	300, 600	P G	N	0.40	—	
Robuste ..	FBRU	—	Navy ..	300, 600	P G	N	0.05	—	
Rochambeau ¹ ..	FTR	300	Cie Gén. Transatlantique ..	300, 600	P G	N	0.40	—	
Rochebonne ¹ ..	FDH	150	—	300, 600	P G	N	0.40	—	
Rochelle (La) ¹ ..	FQH	160	Cie Gén. Transatlantique ..	300, 600	P G	N	0.40	—	
Roland-Morillot ..	FARM	—	Navy ..	300, 600	P G	N	0.05	—	
Roma FJR ¹ ..	FJR	250	Cie des Pêcheries Mar. de l'Atlantique ..	300, 600	P G	N	0.40	—	
Romazotti ..	FAZO	—	Navy ..	300, 600	P G	N	0.05	—	
Rorqual ¹ ..	FHQ	150	Poret-Lobez & Cie ..	300, 600	P G	N	0.40	—	
Rosemonde ¹ ..	FHR	150	Victor Fourny ..	300, 600	P G	N	0.40	—	
Rosita ¹ ..	FHV	150	Victor Fourny ..	300, 600	P G	N	0.40	—	
Rouen FZR ⁸ ..	FZR	150	State Railways Administration ..	300, 600	P G	N	0.15	3.50	
Sabre FBRS ..	FBCS	—	Navy ..	300, 600	P G	N	0.05	—	
Sagare ..	FBRB	—	Navy ..	300, 600	P G	N	0.05	—	
Saghalien ¹ ..	FNS	—	Cie des Messageries Maritimes ..	300, 600	P G	N	0.05	—	
Saïou ..	FBFI	300	Navy ..	300, 600	P G	N	0.40	—	
Sakalave ..	FBKH	—	Navy ..	300, 600	P G	N	0.05	—	
Salta ¹ ..	FVS	250	Cie Gén. des Transports Mar. à Vap. ..	300, 600	P G	N	0.05	—	
Samara ¹ ..	FSM	300	Cie de Nav. Sud-Atlantique ..	300, 600	P G	N	0.40	—	
Samson ..	FASN	—	Navy ..	300, 600	P G	N	0.05	—	
Sané ..	FASN	—	Navy ..	300, 600	P G	N	0.05	—	
Sanglier ..	FBFG	—	Navy ..	300, 600	P G	N	0.05	—	
Sans-Souci ..	FBJS	—	Navy ..	300, 600	P G	N	0.05	—	
Sape ..	FBBA	—	Navy ..	300, 600	P G	N	0.05	—	

FBSR	Sarigue ..	—	Navy	..	..	300, 600	P G	..	N	0.05
FDU	Saverne !..	—	Cie Gén. Transatlantique	—	..	—	P G	..	X	0.40
FDS	Savoie FTS !	300	Soc. Gén. des Transports Mar.	à	..	300, 600	P G	..	X	0.40
FVA	Savoie FVA *	300	Soc. Gén. des Transports Mar.	à	Vap.	300, 600	P G	..	N	0.10
FYW	Savoie FYW !	—	Armond Coppin	..	..	—	P G	..	X	0.40
FSC	Scarpe	—	Navy	..	..	300, 600	P G	..	N	0.05
FBPS	Sédusant	—	Navy	..	..	300, 600	P G	..	N	0.05
FRSY	Seignelay	—	Navy	..	..	300, 600	P G	..	N	0.05
FAIS	Seine I	—	Navy	..	..	300, 600	P G	..	N	0.05
FASO	Senmole FASO	—	Navy	..	..	300, 600	P G	..	N	0.05
FSSL	Sénégalais	—	Navy	..	..	300, 600	P G	..	N	0.05
FQB	Sénégalais	—	Cie Gén. Transatlantique	..	..	—	P G	..	N	0.40
FBNS	Sentinelles	—	Navy	..	..	300, 600	P G	..	N	0.05
FWW	Séphora Worms..	—	Navy	..	..	—	P G	..	X	0.40
FAMS	Shamrock FAMS	—	Navy	..	..	300, 600	P G	..	X	0.05
FDS	Shamrock FDS !	200	Cie des Pêcheries Maritimes de l'Atlantique	..	..	300, 600	P G	..	X	0.40
FWF	Shourallah !	250	Soc. Mar. et Comm. du Pacifique	..	..	—	P G	..	X	0.40
FVH	Sidi-Abdallah *	200	Soc. Gén. des Transports Mar. à Vap	..	..	300, 600	P G	..	N	0.10
FVB	Sidi-Brahim *	200	Soc. des Gén. Transports Mar. à Vap.	..	..	300, 600	P G	..	N	0.10
FIO	Sidon !	300	Cie des Messageries Maritimes	..	..	300, 600	P G	..	N	0.40
FVI	Sierantz !	150	L. Dreyfus & Cie	..	..	300, 600	P G	..	X	0.40
FRI	Simon Duhamel !	300	Soc. les Pêcheries de Fécamp	..	..	300, 600	P G	..	X	0.40
FASI	Simoun ..	—	Navy	..	..	300, 600	P G	..	N	0.05
FBSL	Sioux ..	—	Navy	..	..	300, 600	P G	..	N	0.05
FBOS	Sirocco ..	200	Navy	..	..	300, 600	P G	..	X	0.05
FHK	Slack !	—	Vidor & Cie	..	..	300, 600	P G	..	N	0.40
FBOM	Somali FBOM	—	Navy	..	..	300, 600	P G	..	N	0.05
FBFO	Somme FBFO	—	Vidor & Coe	..	..	—	P G	..	X	0.40
FHT	Somme FHT !	200	Cie Gén. Transatlantique	..	..	300, 600	P G	..	N	0.40
FQS	Somme FQS !	200	N. Paquet & Cie	..	..	300, 600	P G	..	N	0.40
FPW	Souirah !	200	N. Paquet & Cie	..	..	—	P G	..	N	0.40
FPM	Sous !	—	Navy	..	..	300, 600	P G	..	N	0.05
FBSP	Spahi	—	Cie des Messageries Maritimes	..	..	—	P G	..	N	0.40
FNX	Sphinx !	200	Soc. Mar. aux. de Transports	..	..	300, 600	P G	..	N	0.40
UGS	Stilbe !	—	Navy	..	..	300, 600	P G	..	N	0.05
FBUI	Surpille	—	Navy	..	..	300, 600	P G	..	X	0.40
FBVS	Surveillante	—	Navy	..	..	300, 600	P G	..	N	0.05
FWZ	Suzanne et Marie FWZ !	300	Worms & Cie	..	..	—	P G	..	X	0.40
FVZ	Suzanne et Marie FYZ !	150	Poret-Lobez & Cie	..	..	300, 600	P G	..	X	0.40
FKB	Sybil	—	Cie des Chargeurs f. Plisson & Cie	..	..	—	P G	..	X	0.40
FQP	S. Adresse !	200	Cie Gén. Transatlantique	..	..	300, 600	P G	..	X	0.40
FOA	S. Ambroise !	300	Soc. Nav. de l'Ouest	..	..	—	P G	..	X	0.40
FQW	S. André !	—	Cie Gén. Transatlantique	..	..	—	P G	..	N	0.40
FRY	S. Anne !	—	Soc. Mar. aux. de Transports	..	..	300, 600	P G	..	N	0.40
FON	S. Barnabé !	150	Soc. Navale de l'Ouest	..	..	300, 600	P G	..	N	0.40
FYS	S. Barthélémy !	—	Soc. Navale de l'Ouest	..	..	—	P G	..	X	0.40
FEL	S. Elai	—	Worms & Cie	..	..	—	P G	..	X	0.40
FWE	S. François !	—	Cie Navale de l'Océanie	..	..	—	P G	..	X	0.40
FOF	S. François !	—	Cie Gén. Transatlantique	..	..	—	P G	..	X	0.40
FZJ	S. Jean !	150	Soc. des Œuvres de Mer	..	..	300, 600	P G	..	X	0.40
FZS	S. Jehanne !	200	Soc. Navale de l'Ouest	..	..	300, 600	P G	..	X	0.40
FOS	S. Louis FOS !	—	Soc. Navale de l'Ouest	..	..	—	P G	..	N	4.00

Ship Stations—Continued

Name.	Call Signal	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
FRANCE—contd.									
S. Louis FTF ¹	FTF	150	Cie Gén. Transatlantique	300, 600	P G	N	—	—	
S. Marc FOC ¹	FOC	—	Soc. Navale de l'Ouest	—	P G		0.40	—	
S. Marc FRF ¹	FRF	200	Soc. Navale de l'Ouest	300, 600	P G	X	0.40	—	
S. Mathieu ¹	FOT	300	Soc. Navale de l'Ouest	300, 600	P G	X	0.40	—	
S. Michel ¹	FON	200	Soc. Navale de l'Ouest	300, 600	P G	X	0.40	—	
S. Nazaire ¹	FRZ	150	Soc. Mar. aux. de Transports	300, 600	P G	N	0.40	—	
S. Paul FOL ¹	FOL	—	Soc. Navale de l'Ouest	—	P G	N	0.40	—	
S. Pierre ¹	FOI	—	Soc. Navale de l'Ouest	—	P G	N	0.40	—	
S. Raphaël ¹	FAS	150	Soc. F. d'Armement	300, 600	P G	N	0.10	—	
S. Servan ¹	FTQ	200	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
S. Thomas FOH ¹	FOH	300	Soc. Navale de l'Ouest	300, 600	P G	N	0.40	—	
S. Tropez ¹	FAJ	250	Soc. F. d'Armement	300, 600	P G	N	0.40	—	
S. Vincent FOV ¹	FOV	150	Soc. Navale de l'Ouest	300, 600	P G	N	0.40	—	
Tafna FXT ¹	FXT	150	Cie de Nav. Mixte à Vapeur	300, 600	P G	N	0.40	—	
Tahure	FBTH	—	Navy	300, 600	P G	N	0.05	—	
Taillebourg	FATG	—	Navy	300, 600	P G	N	0.05	—	
Tapage	FAGT	—	Navy	300, 600	P G	N	0.05	—	
Tapageuse	FBTA	—	Navy	300, 600	P G	N	0.05	—	
Tavignano ¹	FXG	—	Navy	300, 600	P G	N	0.40	—	
Taza ¹	FOZ	160	Cie de Nav. Mixte à Vapeur	300, 600	P G	N	0.40	—	
Tchad ¹	FCO	300	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
Téméraire FBZT	FBZT	—	Cie des Chargeurs Réunis	300, 600	P G	N	0.05	—	
Tensift ¹	FPU	—	N. Paquet & Cie	—	P G	N	0.40	—	
Texas FQT ¹	FQT	300	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
Thuya	FATU	—	Navy	300, 600	P G	N	0.05	—	
Timgad ¹	FGO	250	Cie Gén. Transatlantique	300, 600	P G	N	0.10	—	
Tintamarre	FBPT	—	Navy	300, 600	P G	N	0.05	—	
Tirailleur ¹	FBTI	—	Navy	300, 600	P G	N	0.05	—	
Titan FQI ¹	FQI	—	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—	
Titan FJA ¹	FJA	300	Soc. les Affrèteurs Réunis	300, 600	P G	N	0.40	—	
Tonkinois	FBKN	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 243	FAHY	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 250	FBCL	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 263	FBDR	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 266	FBNL	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 274	FBNS	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 276	FBEK	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 278	FASZ	—	Navy	300, 600	P G	N	0.05	—	
Torpilleur 288	FBQG	—	Navy	300, 600	P G	N	0.05	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
FRANCE—contd.									
Tumulte ..	FBTU	—	Navy ..	300, 600	P G	N	0.05	—	France.
Turenne ¹ ..	FPN	—	N. Paquet & Cie ..	—	P G	N	0.40	—	—
Typhon ..	FATY	—	Navy ..	300, 600	P G	N	0.05	—	—
Tzar Nicolas II ..	FATZ	—	Navy ..	300, 600	P G	N	0.05	—	—
Utile ..	FAUI	—	Navy ..	300, 600	P G	N	0.05	—	—
Utique ² ..	FWU	—	Delmas Frères ..	—	P G	N	0.40	—	—
Vacarne ..	FBNV	—	Navy ..	300, 600	P G	N	0.05	—	—
Vague ..	FVAG	—	Navy ..	300, 600	P G	N	0.05	—	—
Vallante ..	FBVA	—	Navy ..	300, 600	P G	N	0.05	—	—
Valdivia ¹ ..	FVJ	300	Soc. Gén. des Transports Mar. à Vap. ..	300, 600	P G	N	0.40	—	—
Vaulchise FAVC	FAVC	—	Navy ..	300, 600	P G	N	0.05	—	—
Vaucluse FQV ¹	FQV	200	Cie Gén. Transatlantique ..	300, 600	P G	N	0.40	—	—
Vauquois ..	FBVQ	—	Navy ..	300, 600	P G	N	0.05	—	—
Vautour ..	FBV	—	Navy ..	300, 600	P G	N	0.05	—	—
Véga FVY ¹ ..	FVY	—	Joseph Huret ..	—	P G	N	0.40	—	—
Vendée ¹ ..	FGW	—	Cie Gén. Transatlantique ..	—	P G	N	0.40	—	—
Venezia ¹ ..	FJV	200	Cie f. de Nav. à Vap. Cyprien ..	300, 600	P G	N	0.40	—	—
Vénéziola FTW ¹	FTW	300	Cie Gén. Transatlantique ..	300, 600	P G	N	0.05	—	—
Vernun ..	FBVD	—	Navy ..	300, 600	P G	N	0.05	—	—
Vergniaud ..	FAQV	—	Navy ..	300, 600	P G	N	0.05	—	—
Vérité ..	FAV	—	Navy ..	300, 600	P G	N	0.05	—	—
Victoire ..	FBVI	—	Navy ..	300, 600	P G	N	0.05	—	—
Victor Hugo ..	FAVH	—	Navy ..	300, 600	P G	N	0.05	—	—
Vicomte ..	FAVX	—	Navy ..	300, 600	P G	N	0.05	—	—
Vigoureux ..	FLJ	—	Cie Havraise Péninsulaire de Nav. à Vap. ..	—	P G	N	0.40	—	—
Ville d'Alger ¹ ..	FLJ	—	Cie Havraise Péninsulaire de Nav. à Vap. ..	—	P G	N	0.40	—	—
Ville d'Arras ¹ ..	FLR	—	Cie Havraise Péninsulaire de Nav. à Vap. ..	—	P G	N	0.40	—	—
Ville de Bône ¹ ..	FGB	150	Cie Gén. Transatlantique ..	300, 600	P G	N	0.10	—	—
Ville de Cette ..	FYF	—	Cie des Bateaux à Vap. du Nord ..	—	P G	N	0.40	—	—
Ville de Havre ¹ ..	FLA	200	Cie Havraise Péninsulaire de Nav. à Vap. ..	300, 600	P G	N	0.40	—	—
Ville de Madrid ^{1 10}	FGM	150	Cie Gén. Transatlantique ..	300, 600	P G	N	0.10	—	—
Ville de Majunga ¹	FLI	200	Cie Havraise Péninsulaire de Nav. à Vap. ..	300, 600	P G	N	0.40	—	—
Ville de Marseille ¹	FLS	150	Cie Havraise Péninsulaire de Nav. à Vap. ..	300, 600	P G	N	0.40	—	—
Ville de Nantes ^{1 11}	FGL	—	Cie Gén. Transatlantique ..	—	P G	N	0.10	—	—

Ville de Paris	FLP	250	Cie Havraise Péninsulaire de Nav. à Vap.	300, 600	P G	X	0.40		
Ville de Reims ¹	FLM	—	Cie Havraise Péninsulaire de Nav. à Vap.	—	P G	N	0.40		
Ville de Rouen ¹	FLL	200	Cie Havraise Péninsulaire de Nav. à Vap.	300, 600	P G	X	0.40		
Ville de Tamatave ¹	FLQ	150	Cie Havraise Péninsulaire de Nav. à Vap.	300, 600	P G	N	0.40		
Ville de Tunis ^{1, 2}	FGT	250	Cie Gén. Transatlantique..	300, 600	P G	N	0.10		
Ville d'Oran FGZ ^{1, 2}	FGZ	200	Cie Gén. Transatlantique..	300, 600	P G	N	0.10		
Ville d'Oran FLO ¹	FLO	200	Cie Havraise Péninsulaire de Nav. à Vap.	300, 600	P G	X	0.40		
Ville d'Ys	FBVY	—	Navy	300, 600	P G	N	0.05		
Vinh-Long	FAVL	—	Navy	300, 600	P G	N	0.05		
Virginie ¹	FTV	250	Cie Gén. Transatlantique..	300, 600	P G	N	0.40		
Vitry-le-François	FBVL	—	Navy	300, 600	P G	N	0.05		
Volta	FATV	—	Navy	300, 600	P G	N	0.05		
Voltaire	FAIV	—	Navy	300, 600	P G	N	0.05		
Vulcan ¹	FRV	150	Soc. les Affrèteurs Réunis	300, 600	P G	X	0.40		
Waldeck-Rousseau	FAWR	—	Navy	300, 600	P G	N	0.05		
Wimerux ¹	FWH	200	Vidor & Cie	300, 600	P G	N	0.40		
Yser FAY ¹	FAY	—	Soc. Gén. d'Armement	300, 600	P G	N	0.40		
Yser FBVR	FBVR	—	Navy	300, 600	P G	N	0.05		
Yucca FBYU	FBYU	—	Navy	300, 600	P G	N	0.05		
Zébu	FAZU	—	Navy	300, 600	P G	N	0.05		
GERMANY									
Achilles DAC ¹	DAC	200	Reichsabrechnungsstelle	300, 600	P G	X	0.40		¹ Operated by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin
Adler ¹	DAR	100	Argo S.S. Co.	300, 600	P G	X	0.40		² Operated by the owner
Arbeit ¹	DAT	200	Reichsabrechnungsstelle	300, 600	P G	X	0.40		³ Operated by the owner; the accounts are settled by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin
Arfeld ¹	DAO	200	Continental Reederei A.G.	300, 600	P G	X	0.40		⁴ Operated by the Deutsche Seefischer-Verein, Berlin
Annie-Hugo Stinnes VI ¹	DAI	200	Hugo Stinnes, Mülheim	300, 600	P G	X	0.40		⁵ The ship is at the present time in the service of Hans Hinrich Schmidt (Reedereiverband), Hamburg
Bagdad DVB ¹	DVB	200	Deutsche Levant Line	300, 600	P G	X	0.12		⁶ The ship is at the present time in the service of Lilienfeld u. Zacher, Hamburg
Bubendey ¹	DEV	200	Hamburg-Amerika Line	300, 600	P G	X	0.40		⁷ The ship is at the present time in the service of the Woermann Line, Hamburg
Capri DCW ¹	DCW	200	R. M. Sloman, Jr.	300, 600	P G	X	0.40		
Caroline Hemsoth ¹	DKH	200	Wilhelm Hemsoth Co.	300, 600	P G	X	0.40		
Cette ¹	DXN	200	R. M. Sloman, Jr.	300, 600	P G	X	0.40		
Geuta ¹	DCX	200	Odenburg - Portugiesische S.S. Co.	300, 600	P G	X	0.40		
Condor DOJ ¹	DOJ	200	R. M. Sloman, Jr.	300, 600	P G	X	0.40		
Gronshagen ¹	DCN	200	Hamburg Süd-Amerik, S.S. Co.	300, 600	P G	X	0.40		
Gronshagen ^{1, 2}	DDU	110	Prussian Riv. Administration	300, 375, 600	P R ¹³	X	0.30		
Dünar Koel ¹	DKV	28	Hamburgische Marineverwaltung	300	O	X	—		
Einkreit ¹	DEI	200	Reichsabrechnungsstelle	300, 600	P G	X	0.40		
Eisbrecher Berlin ¹	DJY	75	Die vorsteher der Kaufmannschaft	300, 600	P G	X	0.40		
Eisbrecher Pommern ¹	DJZ	75	Die vorsteher der Kaufmannschaft	300, 600	— ¹³	X	0.40		
Ernst ¹	DER	200	Capt. Gadebges	300, 600	P G	X	0.40		
Ernst-Hugo Stinnes XI ¹	DES	200	Hugo Stinnes	300, 600	P G	X	0.40		
Florenz ¹	DXO	200	R. M. Sloma Mülheim	300, 600	P G	X	0.40		
Friedrich Carl ¹	DFK	200	Carl An, Jogh-nu Jr.	300, 600	P G	X	0.40		

¹ Operated by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin
² Operated by the owner
³ Operated by the owner; the accounts are settled by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin
⁴ Operated by the Deutsche Seefischer-Verein, Berlin
⁵ The ship is at the present time in the service of Hans Hinrich Schmidt (Reedereiverband), Hamburg
⁶ The ship is at the present time in the service of Lilienfeld u. Zacher, Hamburg
⁷ The ship is at the present time in the service of the Woermann Line, Hamburg

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
GERMANY—contd.									
Friedrich Franz IV ³	DFU	200	Mecklenburg Rly.	300, 400, 800	P G	—	—	—	The ship is at the present time in the service of the Woermann Line and of the Deutsche Ostafrika Line, Hamburg
Friesland DFI ³	DFI	50	Wasserbauamt, Emden	300	O	—	—	—	
Fritz Stauss ³	DZX	200	Deutsche Petroleum A.-G.	300, 800	P G	X	0.40 ^{1a}	4.00 ^{1a}	
Fuchs ³	DFS	200	Government	300, 800	P G	X	0.40	4.00	
Gretchen Müller ³	DFP	125	Otto A. Müller	300, 800	P G	X	0.40	4.00	
Grimm ¹	DGM	200	Hamburg-Amerika Line	300, 800	P G	X	0.40	4.00	
Grüssgott ³	DGR	200	Norddeutscher Lloyd	300, 800	P G	X	0.40	4.00	
Heinrich-Hugo Stinnes VII ³	DHH	200	Hugo Stinnes, Mülheim	300, 800	P G	X	0.40	4.00	
Helene Blumenfeld ³	DHB	200	Bd. Blumenfeld	300, 800	P G	X	0.40	4.00	
Helios DHS ³	DHS	200	Deutsche - Amerikanische Petroleum Co.	300, 800	P G	X	0.40	4.00	
Hera ³	DHK	200	Deutsche - Amerikanische Petroleum Co.	300, 800	P G	X	0.40 ^{1a}	4.00 ^{1a}	
Herkules ³	DHE	200	Bugster-Reederei- and Bergungs-A.-G.	300, 800	P G	X	0.40	4.00	Public correspondence, relating to the service of the ship
Herzogin Cäcilie ³	DHZ	200	Norddeutscher Lloyd	300, 800	P G	X	0.40	4.00	
Iduna ¹	DID	200	Johannes Lamp, Hamburg	300, 800	P G	X	0.40	4.00	
Kaiser ¹	DKQ	200	Hamburg-Amerika Line	300, 800	P G	N	0.12	—	
Kiew ³	DKW	50-60	Woermann Line and Deutsche Ostafrika Line	300, 800	P G	N	0.40	4.00	
Lili Woermann ¹	DWX	200	Woermann Line	300, 800	P G	X	0.40	4.00	
Lisboa DLA ³	DLA	200	Oldenburg-Portugiesische S.S. Co.	300, 800	P G	X	0.40	4.00	
Loki ³	DLK	200	Deutsche-Amerikanische Petroleum Co.	300, 800	P G	X	0.40	4.00	
Lothar Bohlen ¹	DOB	200	Woermann Line	300, 800	P G	X	0.40	4.00	
Mannheim ³	DMA	200	Deutsch-Amerikanische Petroleum Co.	300, 800	P G	X	0.40	4.00		The service of the line, concerning the railway traffic
Martha Woermann ¹	DWW	200	Woermann Line	300, 800	P G	X	0.40	4.00	
Mecklenburg DFV ³	DFV	200	Mecklenburg Rly.	300, 400, 800	P G	X	—	—	
Mowe ¹	DMW	100	Argo S.S. Co.	300, 800	P G	X	0.40	4.00	
Mowe DMV ³	DMV	200	Danisch Levant Line	300, 800	P G	X	0.40	4.00	
Najade ³	DNI	60	Norddeutscher Lloyd	300, 800	P G	X	0.12	—	
Neubau 76	DAE	200	Deutsch-Australische S.S. Co.	300, 800	P G	X	0.40	4.00	
Niobe DNI ³	DNI	200	Deutsch-Amerikanische Petroleum Co.	300, 800	P G	X	0.40	4.00	
Nixe ³	DNX	60	Norddeutscher Lloyd	300, 800	P G	X	0.12	—	
Ostsee ³	DOE	200	Government	300, 800	P G	X	0.40	4.00	
Otto-Hugo Stinnes IX ³	DOH	200	Hugo Stinnes, Mülheim	300, 800	P G	X	0.40	4.00	Ferry-boat A for the

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
GREECE—contd.									
Chios ²	SVB	100-150	Hellenic Co. of Mar. Enterprises..	300, 600	PG	N	France.	France.	
Daphne ²	TGA	150-200	Hellenic Co. of Mar. Enterprises	300, 600	PG	X	0.40	4.00	
Daphni ²	SWX	—	Navy	—	PG		—	—	
Dionysios Stathatos ²	SVZ	150-200	Dionysios Stathatos	300, 600	PG	X	0.40	4.00	
Diphris ²	SVY	100-150	Panhellenique S. N. Co.	300, 600	PG	N	0.40	4.00	
Doris SYV	SVY	—	Navy	—	O		—	—	
Doxa ²	SYD	150-200	Navy	—	O		—	—	
Eftathios ²	SWD	150-200	S. G. Embiricos	300, 600	PG	X	0.40	4.00	
Ellin ²	SWO	150-200	E. Ladopoulos	300, 600	PG	X	0.40	4.00	
Elpidiphoros ²	SWH	100-150	Hellenic Co. of Mar. Enterprises..	300, 600	PG	N	0.40	4.00	
Epis ²	SVL	100-150	Hellenic Co. of Mar. Enterprises..	300, 600	PG	X	0.40	4.00	
Elsie ²	TGE	150-200	Hellenic Co. of Mar. Enterprises..	300, 600	PG	X	0.40	4.00	
Eperoki ²	SWU	100-150	G. Yanoulatos Bros.	300, 600	PG	X	0.40	4.00	
Erisos ²	SVE	100-150	Gregory I. Theophilatos	300, 600	PG	X	0.40	4.00	
Ermoupolis ²	SVO	100-150	Hellenic Co. of Mar. Enterprises..	300, 600	PG	X	0.40	4.00	
Evangelos ²	SWK	150-200	N. Ambatielos & Co.	300, 600	PG	N	0.40	4.00	
G-roissa ²	SVG	150	Comp. Nat. Hellenique de Nav.	300, 600	PG	X	0.40	4.00	
Granicos ²	SWS	150-200	Embricos Bros.	300, 600	PG	X	0.40	4.00	
Helli ²	SZA	—	Navy	—	O		—	—	
Hilariou ²	SWL	—	Navy	—	O		—	—	
Hydra SYH	SVH	100-150	Hellenic Co. of Mar. Enterprises..	300, 600	PG	N	0.40	4.00	
Hydra SVH ²	SVH	—	Navy	—	O		—	—	
Ierax ²	SYE	—	Navy	—	O		—	—	
Ioannis Vatis ²	SWR	100-150	J. L. Vatis & Co.	300, 600	PG	X	0.40	4.00	
Ioannis ²	SWJ	100-150	Hellenic Transport Co.	300, 600	PG	X	0.40	4.00	
Irene SYV ²	SWI	50-80	N. Galanos	300, 600	PG	X	0.40	4.00	
Irene ²	SWT	100-150	P. Margaritis & Sons	300, 600	PG	X	0.40	4.00	
Ismene ²	TGF	150-200	Hellenic Co. of Mar. Enterprises..	300, 600	PG	X	0.40	4.00	
Istros ²	SVW	150-200	S.R.M. Vlassopoulos	300, 600	PG	X	0.40	4.00	
Julia ²	SWE	150-200	Vergottis	300, 600	PG	X	0.40	4.00	
Kalypso Vergotti ²	SVK	150-200	Navy	—	PG		—	—	
Kanaris ²	SYJ	—	Navy	—	O		—	—	
Kate ²	SW7	150-200	Lykiardopoulo	300, 600	PG	X	0.40	4.00	
Keravnos ²	SYK	—	Navy	—	O		—	—	
Kilkis SZC	SZC	—	Navy	—	O		—	—	
Leon ²	SYL	—	Navy	—	O		—	—	
Limonos ²	SZL	—	Navy	—	O		—	—	
Livanos ²	SWL	150-200	G. Livanos	300, 600	PG	X	0.40	4.00	
Lonchi ²	SYC	—	Navy	—	O		—	—	

Maroudio Ingleesi ²	SWM	100-150	D. Ingleesi & Sons	300, 600	P G	..	X	0.40	4.00	
Meandros ¹	—	100-150	Comp. Nat. Hellenique de Nav.	300, 600	P G	..	N	0.40	4.00	
Megali Hellas ²	SVV	200-250	A. A. Cappas	300, 600	P G	..	N	0.40	4.00	
Melpo ²	SVV	150-200	A. Bistis	300, 600	P G	..	X	0.40	4.00	
Michael Bistis ²	SWF	150-200	S. G. Embiricos	300, 600	P G	..	X	0.40	4.00	
Michael L. Embiricos ²	SWY	150-200	Hellenic Co. of Mar. Enterprises	300, 600	P G	..	N	0.40	4.00	
Mykali ²	SVF	100-150	Navy	—	O	..	—	—	—	
Nafkratoua	SVR	—	Navy	—	O	..	—	—	—	
Nea Gennea	SYG	100-150	A. Athanassulis	300, 600	P G	..	X	0.40	4.00	
Nicolaos Athanassulis ²	SVI	100-150	Navy	—	O	..	—	—	—	
Niki	SYN	—	Navy	—	O	..	—	—	—	
Nikopolis	SZD	150-200	Sallariss and Negropontes	300, 600	P G	..	X	0.40	4.00	
Nora Saliari ²	SWN	100-150	Othon Stathatos	300, 600	P G	..	X	0.40	4.00	
Othon Stathatos ²	SWQ	100-150	P. Pantaleon Fils	300, 600	P G	..	N	0.40	4.00	
Ourana ²	SYN	100-150	—	300, 600	P G	..	X	0.40	4.00	
Panaghis ²	SWP	150-200	—	—	—	..	—	—	—	
Panaghis Vergottis ²	THZ	—	Navy	—	O	..	—	—	—	
Panthir ²	SYP	100-150	Panhellenique S. N. Co.	300, 600	P G	..	N	0.40	4.00	
Pantias Rallis ²	SWB	100-150	Comp. Nat. Hellenique de Nav.	300, 450, 600	P G	..	N	0.40	4.00	
Patris ²	SVP	140	Hellenic Co. of Mar. Enterprises	300, 600	P G	..	N	0.40	4.00	
Peloponissos ²	SVD	100-150	Hellenic Co. of Mar. Enterprises	300, 600	P G	..	X	0.40	4.00	
Pelops ²	TGB	100-150	Hellenic Co. of Mar. Enterprises	300, 600	P G	..	X	0.40	4.00	
Pinios ²	TGC	100-150	Navy	—	O	..	X	0.40	4.00	
Promitheis	SZE	—	Navy	—	O	..	—	—	—	
Para	SVQ	150-200	Navy	300, 600	P G	..	X	0.40	4.00	
Rokos Vergotis ²	SVU	—	G. Vergotis	—	O	..	—	—	—	
Stendoni	SVF	—	Navy	—	O	..	—	—	—	
Spetsai	SVS	—	Hellenic Co. of Mar. Enterprises	300, 600	P G	..	X	0.40	4.00	
Spetzai TGD ²	TGD	100-150	G. Livanos	300, 600	P G	..	X	0.40	4.00	
Spyridon ²	TGG	150-200	—	300, 600	P G	..	N	0.40	4.00	
Seria ²	SVC	200	Comp. Nat. Hellenique de Nav.	300, 450, 600	P G	..	N	0.40	4.00	
Themistocles SVT ²	SVT	—	Hellenique Transatlantique S.N.Co.	—	P G	..	N	0.40	4.00	
Thetis SYZ	SVZ	—	Navy	—	O	..	—	—	—	
Thyella	SVT	—	Navy	—	O	..	—	—	—	
Valos	SVB	—	Navy	—	O	..	—	—	—	
Youtia ²	SWE	200-150	P. Scampivas & G. Sigalas	300, 600	P G	..	N	0.40	4.00	
Zakynthos ²	SWV	100-150	G. Yanoulatos Bros.	300, 600	P G	..	X	0.40	4.00	
Zannes Simoes ²	SWW	100-150	Société Orientale des Transports	300, 600	P G	..	X	0.40	4.00	
HOLLAND										
Achilles ¹	TWV	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	..	X	0.40	4.00	¹ Operated and controlled by Nederlandsche Telegraaf Maatschappij
Adonis ¹	TWV	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	..	X	0.40	4.00	² "Radio Holland," Amsterdam
Aganemmon ¹	TWV	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	..	X	0.40	4.00	³ Usually corresponds only with other vessels of the Batavier Line or with the coast stations North Foreland Rad and Scheveningen-Port
Alcebaron	HDB	200	V. Nievelt, Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	⁴ Coast charge for radio-telegrams sent through
Alderman	HDD	200	V. Nievelt, Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	
Aigenb ¹	PXK	200	V. Nievelt, Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	
Alloth ¹	HDC	200	V. Nievelt, Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	
Alkaid ¹	PNX	125	V. Nievelt, Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	
Alkmaar ¹	PXH	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	..	X	0.40	4.00	
Almelo ¹	PVG	200-250	Kon. Nederl. Stoomboot Mij.	300, 600	P G	..	X	0.40	4.00	
Alphard ¹	PXL	200	V. Nievelt Goudriaan Stoomv. Mij.	300, 600	P G	..	X	0.40	4.00	
Ambon ¹	PVR	200	"Nederland" Stoomvaart Mij.	300, 600	P G	..	X	0.40	4.00	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
HOLLAND—contd.									
Ameland ..	PIX	50-80	Stoomvaart Mij. Triton ..	300, 600	P G	X	0.40	4.00	North Foreland Rad is
American ¹ ..	PDT	100-150	American Petroleum Co. ..	300, 600	P G	X	0.40	4.00	17 centimes per word,
Anor ..	TWZ	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	if 70 centimes minimum.
Amstedyk ¹ ..	PEE	100-150	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	In addition, for radio-tele-
Amstelland ¹ ..	PZU	200	Kon. Hollandsche Lloyd ..	300, 600	P G	X	0.40	4.00	grams for the U.K., North
Amstelsstroom ¹ ..	TVO	200	Hollandsche Stoomb. Mij.	300, 600	P G	X	0.40	4.00	Foreland Rad coast charge
Andyk ¹ ..	IVA	200	Holland-Amerika Line ..	300, 600	P G	X	0.10	4.00	and the inland telegraph
Antenor ¹ ..	PZL	150-200	Stoomv. Mij. Ocaan. ..	300, 600	P G	X	0.40	4.00	charge must be added
Anton V. Driel ¹ ..	PEP	100-150	V. Driel's N/V. W. Stoomb. en Transp.	300, 600	P G	X	0.40	4.00	⁴ Public correspondence,
Arakan ¹ ..	PHD	100-150	Rotterdamsche Lloyd ..	300, 600	P G	X	0.40	4.00	without ship charge, is
Ares ..	TWV	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.10	4.00	admitted in the absence
Arnhem ..	TXS	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.10	4.00	of official correspondence
Artemis PDZ ¹ ..	PDZ	150-200	Petroleum Mij. La Corona ..	300, 600	P G	X	0.40	4.00	⁵ Common call for aux-
Arundo ¹ ..	PXA	100-150	Mij. Zeevaart (Hudig & Veder)	300, 600	P G	X	0.40	4.00	iliary ships of the Royal
Baarn ¹ ..	TXO	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	Marine: when necessary
Bacchus ¹ ..	TXA	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	followed by the number or
Bali ¹ ..	PIK	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	name of particular ship
Banda ¹ ..	PZM	150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	⁶ Common call for mine-
Bandoeng ¹ ..	PHW	150	Rotterdamsche Lloyd ..	300, 600	P G	X	0.40	4.00	sweepers of the Royal
Bangka ¹ ..	PHI	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	Marine: when necessary
Barndrecht ¹ ..	PXD	200	Ph. van Ommeren ..	300, 600	P G	X	0.10	4.00	followed by the vessel's
Batavier II ¹ ..	PDO	—	Wm. H. Muller & Co. ..	300, 600	P R	N	0.05	0.50	number
Batavier III ¹ ..	PDH	200	Wm. H. Muller & Co. ..	300, 450, 600	P R ²	N	0.05 ³	0.50 ³	⁷ Common call for sub-
Batavier IV ¹ ..	PDI	200	Wm. H. Muller & Co. ..	300, 450, 600	P R ²	N	0.05 ³	0.50 ³	marines of the Royal
Batavier V ¹ ..	PDJ	—	Wm. H. Muller & Co. ..	300, 600	P R ²	N	0.05	0.50	Marine
Batavier VI ¹ ..	PDG	100-150	Wm. H. Muller & Co. ..	300, 600	P R ²	N	0.05 ³	0.50 ³	⁸ Public correspondence
Batjan ¹ ..	PGV	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	only with other vessels of
Batone ¹ ..	PYQ	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	the Zealand Co., or the
Bawean ¹ ..	PHI	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	coast stations Scheve-
Beensdijk ..	TXV	200	Holland-Amerika Line ..	300, 600	P G	X	0.10	4.00	nique-Port and North
Bellatrix ¹ ..	PXQ	125	V. Nieuwt, Goudriaan Stoomv. Mij.	300, 600	P G	X	0.40	4.00	Foreland Rad
Bengkalis ¹ ..	PHZ	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	⁹ For restricted service
Berkelsroom ¹ ..	TVP	200	Hollandsche Stoomb. Mij.	300, 600	P G	X	0.40	4.00	(see note 8) the total
Beukelsdijk ..	TZR	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	charge for messages is
Beursplein ..	TZK	200	N. V. Scheepv. Mij. "Millingen"	300, 600	P G	X	0.40	4.00	40 centimes a word, mini-
Bildersdijk ..	TZU	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	mum 4 francs. For mes-
Bliffluit ..	PFT	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	sages sent via North Fore-
Bimendijk ..	TXZ	200	Holland-Amerika Line ..	300, 600	P G	X	0.10	4.00	land Rad an additional
							0.40	4.00	charge of 17 centimes a

Buitang ¹	PHV	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	word, minimum 70 centimes is made for messages for the U.K. via North Foreland Rad, the coast station charge and the inland rate must be added
Birma ¹	PFR	—	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Blijderdijk	TZQ	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Blommersdijk	TZT	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Boeroe ¹	PHK	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Boeton ¹	PGU	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Bondowoso ¹	PFO	200	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Bontokoe ¹	—	—	Kon. Paketvaart Maatschappij	300, 600	P G	X	0.40	4.00	
Bombong	TYZ	200	Vinke & Co.	300, 600	P G	X	0.40	4.00	
Borneo ¹	PHY	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Boschdijk	TZO	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Brabantia ¹	PZZ	Day 300 Night 1,000	Kon. Hollandsche Lloyd	300, 600, 1,800	P G	N	0.40	4.00	
Breda ¹	TWU	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Bredijk	TXV	200	Holland America Line	300, 600	P G	X	0.40	4.00	
Brielle ¹	TWT	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Brinio ¹	PAV	60	Navy	300, 600	O	—	—	—	
Britsum	TVY	200	Vinke & Co.	300, 600	P G	X	0.40	4.00	
Brunswijk ¹	PIV	50-80	Erhardt & Dekkers	300, 600	P G	X	0.40	4.00	
Buitenzorg ¹	PHU	100-150	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Bulhond	PBZ	150	Navy	300, 600	O	—	—	—	
Buzerdijk	TPP	200	Holland America Line	300, 600	P G	X	0.40	4.00	
Bussum ¹	PZA	125	Stoomvaart Mij. Oostzee	300, 600	P G	X	0.40	4.00	
Calcutta PYT ¹	PVT	150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
California ¹	PXG	200	Tanks s.s. Co., California	300, 600	P G	X	0.40	4.00	
Calypso	TXB	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Caleno ¹	PIV	100-150	Mit Zeevaart, Rotterdam	300, 600	P G	X	0.40	4.00	
Calebes ¹	PGO	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Ceram ¹	PVS	150	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Ceres ¹	PWV	200	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Ceylon PHE ¹	PHE	100-150	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Clio	TXC	300	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Commevijn ¹	PEL	150-200	Kon. West Ind. Maildienst	300, 600	P G	X	0.40	4.00	
Cornelis	TYC	200	Zuid-Ned. Scheepv. Mij.	300, 900	P G	—	0.40	4.00	
Cornelis Drebbe ¹	PAY	40	Navy	300	O	—	—	—	
Cynssen ¹	PYU	200-250	Kon. West Ind. Maildienst	300, 600	P G	—	0.40	4.00	
Dakar	TZM	150-200	N.V. v/d Eb. & Dresselhuys	300, 600	P G	X	0.40	4.00	
Dardanus ¹	PBV	150-200	Stoomvaart Mij. Ocean	300, 600	P G	X	0.40	4.00	
Deitland ¹	PDX	200	Kon. Hollandsche Lloyd	300, 600	P G	X	0.40	4.00	
Deit ¹	PXW	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Deit ¹	PAC	100-150	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
De Ruijter	PAG	200	Navy	300, 600	O	—	—	—	
Deucalion	TXQ	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
De Zeven Provinciën	PAA	400	Navy	300, 600	O	—	—	—	
Diambi ¹	PIM	100-150	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Dièbes ¹	PDM	200	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Diembe ¹	PHF	100-150	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Djocar ¹	PFU	—	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
HOLLAND—contd.									
Drechterland ¹	PDR	150	Kon. Hollandsche Lloyd ..	300, 600	P G	X	0.40	4.00	Frans.
Drechtstroom ¹	TVQ	200	Hollandsche Stoomb. Mij. ..	300, 600	P G	X	0.40	4.00	
Drente ¹	PZY	100	Bureau Wijsmuller ..	300, 600	P G	X	0.40	4.00	
Dubbe ¹	PXS	200	V. Nievelt Goudriaan Stoomv. Mij. ..	300, 600	P G	X	0.40	4.00	
Edam ..	TXU	500-1,000	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Eemdjik	TVJ	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Eemland ¹	PVI	150	Kon. Hollandsche Lloyd ..	300, 600	P G	X	0.40	4.00	
Eibergen ¹	PW	100	Furn. Scheep. & Agent. Mij. ..	300, 600	P G	X	0.40	4.00	
Elisabeth	TVA	200	Zind-Ned. Scheepv. Mij. ..	300, 600	P G	X	0.40	4.00	
Ellewoutsdijk ¹	PVP	200	Sollevold and v. d. Meer ..	300, 600	P G	X	0.40	4.00	
Evertsen	PAN	100	Navy ..	300, 600	O ⁺	—	—	—	
Fret ¹	PBY	150	Navy ..	300, 600	O ⁺	—	—	—	
Friesland ¹	PIH	—	Bureau Wijsmuller ..	300, 600	P G	X	0.40	4.00	
Frisia ¹ ..	PEF	200-250	Kon. Hollandsche Lloyd ..	300, 600	P G	N	0.40	4.00	
Friso	PAW	60	Navy ..	300, 600	O	—	—	—	
Gaasterdijk	TXV	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Gaasterland ¹	PKK	150	Kon. Hollandsche Lloyd ..	300, 600	P G	X	0.40	4.00	
Garoot ¹	PIN	100-150	Rotterdamsche Lloyd ..	300, 600	P G	X	0.40	4.00	
Gelderland	PAK	100	Navy ..	300, 600	O ⁺	—	—	—	
Gelria ¹ ..	PEG	200-250	Kon. Hollandsche Lloyd ..	300, 450, 600	P G	N	0.40	4.00	
Goentoor ¹	PFA	200	Rotterdamsche Lloyd ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Gonymedes ¹	PVI	200	Kon. Nederl. Stoomboot Mij. ..	300, 600	P G	X	0.40	4.00	
Gorredijk ¹	PIL	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Gorontalo ¹	PCC	100-150	Rotterdamsche Lloyd ..	300, 600	P G	X	0.40	4.00	
Gooland ¹	PDU	100	Kon. Hollandsche Lloyd ..	300, 600	P G	X	0.40	4.00	
Gouwestroom ¹	TVR	200	Hollandsche Stoomboot Mij. ..	300, 600	P G	0300 to 0400 0600 to 0800 0900 to 1200 2000 to 2200	0.40	4.00	
De Greve ¹ ..	PMO	100	Kon. Paketvaart Mij. ..	300, 600	P G	—	—	—	
Grano ..	PAU	60	Navy ..	300, 600	O ⁺	—	—	—	
Grootendijk	TXW	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Grootius ¹	PFI	200	"Nederland" Stoomvaart Mij. ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
HOLLAND—contd.									
Karimoen ¹	PGW	100-150	"Nederland" Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	Frans.
Katwyk	TYP	200	Erhardt & Dekkers	300, 600	P G	X	0.40	4.00	
Kawi ¹	PFD	200	Rotterdamse Lloyd	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Kediri ¹	PFY	100-150	Rotterdamse Lloyd	300, 600	P G	X	0.40	4.00	
Kelkheaven	TVF	150-200	Gedrs. van Uden	300, 600	P G	X	0.40	4.00	
Kelbergen ¹	PJZ	100-150	Scheepv. Mij., Rotterdam	300, 600	P G	X	0.40	4.00	
Kennemerland ¹	PVL	200	Kon. Hollandische Lloyd	300, 600	P G	X	0.40	4.00	
Kieldrecht ¹	PXF	200	Stoomvaart Mij. de Maas	300, 600	P G	X	0.40	4.00	
Kilström ¹	TVU	200	Holl. Stoomb. Mij.	300, 600	P G	X	0.40	4.00	
Kinderdijk ¹	TVH	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Kinderdyk ¹	PYY	200	Solleveld, v. d. Meer	300, 600	P G	X	0.40	4.00	
Koningin der Nederlanden ¹	PFV	200	Stoomvaart Mij. Nederland	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Koningin Regentes	PAE	400	Navy	300, 600	O ⁴	—	—	—	
Kortenaar	PAM	100	Navy	300, 600	O ⁴	—	—	—	
Krakatau ¹	PGL	100-150	Nederland Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Leerdam	TVM	500-1,000	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Leersum ¹	PZB	200	Vinke & Co.	300, 600	P G	X	0.40	4.00	
Lemaire ¹	PMQ	100	Kon. Paketvaart Mij.	300, 600	P G	0300 to 0400 0600 to 0800 0900 to 1200 1700 to 1900 2000 to 2200	0.40	4.00	
Limburgia ¹	PZX	Day 500 Night 1,000	Kon. Hollandische Lloyd	330, 600, 1,800	P G	N	0.40	4.00	
Lingestroom ¹	PVN	100	Holl. Stoomboot Mij.	300, 600	P G	X	0.40	4.00	
Lombok ¹	PGL	100-150	Nederland Stoomvaart Mij.	300, 600	P G	X	0.40	4.00	
Lynx	PBX	150	Navy	300, 600	O ⁴	—	—	—	
Maarten Harpertz Tromp	PAB	400	Navy	300, 600	O ⁴	—	—	—	
Maartensdijk ¹	PDQ	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	

Maasdam	TVL	500-1,000	Holland-Amerika Line	..	600	P G	..	X	4.00
Massdyk ¹	PVC	200	Holland-Amerika Line	..	300, 600	P G	..	X	0.40
Maashaven ¹	PXO	150	Mij. Stoomschip Maashaven	..	300, 600	P G	..	X	4.00
Maasland ¹	PYM	200	Kon. Hollandsche Lloyd	..	300, 600	P G	..	X	0.40
Macedonia ¹	PZK	100-150	Holl. Alg. Atl. Scheepv. Mij.	..	300, 600	P G	..	X	0.40
Madrien ¹	PGI	100-150	Rotterdam che Lloyd	..	300, 600	P G	..	X	4.00
Madroer ¹	TWG	—	"Nederland" Stoomvaart Mij.	..	300, 600	P G	..	X	0.40
Madalena	TYB	200	Zuid-Ned. Scheepv. Mij.	..	300, 600	P G	..	X	4.00
Malang ¹	TZA	200	Rotterdamche Lloyd	..	300, 600	P G	..	X	0.40
Manoran ¹	TWH	—	"Nederland" Stoomvaart Mij.	..	300, 600	P G	..	X	4.00
Mapia ¹	TWI	—	"Nederland" Stoomvaart Mij.	..	300, 600	P G	..	X	0.40
Maristo	TZD	200	N.V. v/d Eb. & Dresselhuys	..	300, 600	P G	..	X	4.00
Marken ¹	PZG	100-150	Rotterdamche Lloyd	..	300, 600	P G	..	X	0.40
Medan ¹	PJA	60	Navy	..	300, 600	P G	..	X	—
Medusa	PAR	100-150	Rotterdamche Lloyd	..	300, 600	P G	..	X	4.00
Menado ¹	PGB	100-150	Rotterdamche Lloyd	..	300, 600	P G	..	X	0.40
Merakut ¹	PGE	100-150	Kon. Nederl. Stoomboot Mij.	..	300, 600	P G	..	X	4.00
Mercurius ¹	TVF	200	Holl. Stoomboot Mij.	..	300, 600	P G	..	X	0.40
Merwestroom	TVY	150	Mij. Stoomsch. Mijrecht	..	300, 600	P G	..	X	4.00
Mijrecht	PXE	40	Navy	..	300, 600	P G	..	X	0.40
Mijnenveger ⁶	PAX	200	Kon. Ned. Stoomboot Mij.	..	300, 600	P G	..	X	—
Minerva ¹	TXG	200	V. Nievelt Goudriaan Stv. Mij.	..	300, 600	P G	..	X	4.00
Mirach ¹	PXI	200	Nederland Stoomvaart Mij.	..	300, 600	P G	..	X	4.00
Mora ¹	TKW	—	V. Nievelt, Goudriaan & Co.'s	..	300, 600	P G	..	X	0.40
Mizar	HDA	200	Schv. Mij.	..	300, 600	P G	..	X	4.00
Moerdijk	TVI	200	Holland-Amerika Line	..	300, 600	P G	..	X	0.40
Moerdijk ¹	PVO	200	Solleveld & v. d. Meer	..	300, 600	P G	..	X	4.00
Mont Blanc ¹	PDK	100	Van de Eb. & Dresselhuys	..	300, 600	P G	..	X	0.40
Mont Cenis ¹	TZC	200	N.V. v/d Eb. & Dresselhuys	..	300, 600	P G	..	X	4.00
Montreuil	PXE	150	Ph. van. Onnieren	..	300, 600	P G	..	X	0.40
Naaldwyk	TVN	200	Erhardt & Dekkers	..	300, 600	P G	..	X	4.00
Neresus ¹	TXR	200	Kon. Nederl. Stoomboot Mij.	..	300, 600	P G	..	X	0.40
New York ¹	PHN	100-150	American Petroleum Co.	..	300, 600	P G	..	X	4.00
Nias ¹	PGR	100-150	Nederland Stoomvaart Mij.	..	300, 600	P G	..	X	0.40
Nickerie ¹	PER	150-200	Kon. West. Ind. Maildienst	..	300, 600	P G	..	0.40 to 2200	4.00
Nieuw Amsterdam ¹	PEB	200-250	Holland-Amerika Line	..	300, 600	P G	..	N	4.00
No. 102	PEV	100-150	—	..	300, 600	P G	..	X	4.00
No. 103	PEX	100-150	—	..	300, 600	P G	..	X	4.00
Noordbrabant	PAJ	200	Navy	..	300, 600	P G	..	—	4.00
Noordnam ¹	PEC	200-250	Holland-Amerika Line	..	300, 600	P G	..	N	0.40
Noorddijk ¹	PYX	100	Solleveld & v. d. Meer	..	300, 600	P G	..	X	4.00
Noorddijk ¹	PDL	200	Solleveld & v. d. Meer	..	300, 600	P G	..	X	4.00
Noorddijk ¹	PHG	100	Erhardt & Dekkers	..	300, 600	P G	..	X	0.40
Noorddijk ¹	TZE	200	Wm. v. Driel's Stb.- & Transp. Ondern	..	300, 600	P G	..	X	0.40
Oberon ¹	TXH	200	Kon. Nederl. Stoomboot Mij	..	300, 600	P G	..	X	4.00
Ocean PDS ¹	PDS	100-150	American Petroleum Co.	..	300, 600	P G	..	X	0.40

Ship Stations—Continued

STATIONS—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
HOLLAND—contd.									
Onderzeeboot ⁷	PBO	20	Navy	300	O ⁴	—	—	—	
Oostdijk ¹	PZE	200	Solleveld & V. d. Meer	300, 600	P G	—	0.40	—	
Oostzee ¹	PXU	150	Naamloze Vennootsch. s.s. Oostzee	300, 600	P G	—	0.40	4.00	
Ootmarsum ¹	PXV	200	Vinke & Co.	300, 600	P G	—	0.40	4.00	
Obir PBA	PFA	40	Navy	300	O ⁴	—	—	—	
Oranje ¹	PFP	200	"Nederland" Stoomvaart Mij...	300, 600	P G	—	—	4.00	
Oranje Nassau PDE	PDE	150	Stoomvaart-Mij. Zeeland	300, 500, 600	P R ⁸	—	—	—	
Oranje Nassau PEM ¹	PEM	150-200	Kon. West Ind. Maildienst	300, 600	P G	—	0.40	4.00	
Orestes ¹	PYC	200	Kon. Nederl. Stoomb. Mij.	300, 600	P G	—	—	—	
Palembang	PEY	200	Rotterdamsche Lloyd	300, 600	P G	—	0.40	4.00	
Pangrango	PBC	40	Navy	300	O ⁴	—	—	—	
Panther	PBS	150	Navy	300	O ⁴	—	—	—	
Parthaven	TYL	150-200	Gebrs. van Uden	300, 600	P G	—	—	—	
Patria ¹	PFT	Day 500 Night 1,000	Rotterdamsche Lloyd	300, 600, 1,800	P G	—	—	—	
Patroclus ¹	PEU	150-200	Stoomvaart Mij. Oceaan	300, 600	P G	—	—	—	
Peeland ¹	PZW	200	Kon. Hollandsche Lloyd	300, 600	P G	—	—	—	
Phedra ¹	TYD	200	V. Nievelt, Goudriaan & Co.'s	300, 600	P G	—	—	—	
Piet Hein	PAO	100	Schv. Mij.	300, 600	P G	—	—	—	
Pierius ¹	—	—	Kon. Paketvaart Maatschappij	300, 600	O	—	—	—	
Poldyk ¹	TXI	200	Holland-Amerika Line	300, 600	P G	—	—	—	
Pollux ¹	PAG	200	Kon. Nederl. Stoomboot Mij.	300, 600	P G	—	—	—	
Posidon	TXI	200	Navy	300, 600	P G	—	—	—	
Prins der Nederlanden	PEN	150-200	Kon. Ned. Stoomboot Mij.	300, 600	O P G	—	—	—	
PEN ¹	—	—	Kon. West Ind. Maildienst	300, 600	P G	—	—	—	
Prins de Nederlanden	PFQ	200	"Nederland" Stoomvaart Mij. ...	300, 600	P G	—	—	—	

Phases Juliana PFN 1	PFN	200	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Prins Fred. Hendrik 1.	PEK	150-200	Kon. West Ind. Maildienst	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Prins Hendrik 1.	PDC	150	St. Mij. Zeeland	300, 500, 800	P R 8	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Prins Willem I 1	PEO	200	Kon. West Ind. Maildienst	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Procyon 1	PXR	125	V. Nieuvelt Goudriaan Strm. Mij.	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Radja 1	PHA	100-150	"Nederland" Stoomvaart Mij. ...	300, 450, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Randwijk 1	PIU	50-80	Erhardt & Dekkers	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Van Rees 1	—	200	Kon. Paketvaart Mij.	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rembrandt 1	PFK	200	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rijndam 1	PED	200-250	Holland-Amerika Line	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rijndijk 1	PVZ	150	Solleveld & V. D. Meer	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rijnland 1	PDN	200	Kon. Hollandsche Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rijsbergen 1	PZI	200	Zuid-Hollandsche Scheepv. Mij.	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rijswijk 1	PIT	50-80	Erhardt & Dekkers	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rindjan 1	PFH	200	Rotterdamsche Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rindjani	PBB	40	Navy	300	O 4	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	—	—
Riouw 1	PHB	100-150	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Roeapat 1	PHL	100-150	"Nederland" Stoomvaart Mij. ...	300, 450, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rondo 1	PHM	100-150	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rode Zee 1	PIA	100	L. Smitt & Co's Sleepdienst	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rooddam PEA 1	PEA	200-250	Holland-Amerika Line	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rotterdam PHH 1	PHH	100	American Petroleum Co.	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rott 1	PHC	100-150	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Rozenburg 1	PZS	150-200	Stoomb. "De Goede Verwachting"	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Saibangk 1	TWB	—	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Salawati 1	TWC	—	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Saier 1	TWA	—	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Salland 1	PZJ	200	Kon. Holland che Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Samarinda 1	PGH	100-150	Rotterdamsche Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Saparce 1	PET	150-200	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Sarpedon 1	TXJ	200	Stoomv. Mij. Ocean	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Saturnus 1	PIQ	150-200	Kon. Nederl. Stoomboot Mij.	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Schiedijk 1	PDW	150-200	Petroleum Mij. La Corona	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Selene 1	TWF	—	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Senbilan 1	—	—	Kon. Paketvaart Maatschappij	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Sigil 1	—	—	"Nederland" Stoomvaart Mij. ...	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Simaloer 1	TWD	—	Rotterdamsche Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00
Sindoro 1	PFE	200	Rotterdamsche Lloyd	300, 800	P G	0600 to 0900 1000 to 1200 1400 to 1800 2000 to 2200	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
HOLLAND—contd.									
Sinkep ¹	..	—	"Nederland" Stoomvaart Mij. ..	300, 600	P G	X	Francs.	4.00	
Sirrah ¹	..	200	V. Nievelt Goudriaan Stmv. Mij. ..	300, 600	P G	X	0.40	4.00	
Sitobondo ¹	..	100-150	Rotterdamse Lloyd ..	300, 600	P G	X	0.40	4.00	
Slave ¹	..	—	Kon. Paketvaart Maatschappij ..	300, 600	P G	X	0.40	4.00	
Slidrecht ¹	..	150	Ph. van. Ommeren ..	300, 600	P G	X	0.40	4.00	
Sloet V. D. Beede ¹	..	200	Kon. Paketvaart Mij. ..	300, 600	P G	X	0.40	4.00	
Sloterdijk ¹	..	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Smerece ¹	..	40	Navy ..	300	O ⁴	—	—	—	
Soemba ¹	..	—	"Nederland" Stoomvaart Mij. ..	300, 600	P G	X	0.40	4.00	
Soerakarta ¹	..	100-150	Rotterdamse Lloyd ..	300, 600	P G	X	0.40	4.00	
Soesdijk ¹	..	200	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Sommelsdijk ¹	..	100-150	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Spaandam ¹	..	500-1,000	Holland-Amerika Line ..	300, 600	P G	X	0.40	4.00	
Stad Amsterdam ¹	..	150-200	Stoom Mij. "Stad Amsterdam" ..	300, 600	P G	X	0.40	4.00	
Stad-dijk ¹	..	200	Holland-Amerika Line ..	300, 600	P G	X	0.10	4.00	
Stad Arnhem ¹	..	200	Arnhemse Scheep. Mij. ..	300, 600	P G	X	0.40	4.00	
Stad Dordrecht ¹	..	150-200	Stoomv. Mij. "Stad Dordrecht" ..	300, 600	P G	X	0.40	4.00	
Stad Valkenburg ¹	..	200	Stoomv. Mij. Zuid Holland ..	300, 600	P G	X	0.40	4.00	
Stad Zaandam ¹	..	200	Stoomv. Mij. "Stad Zalt Bommel" ..	300, 600	P G	X	0.40	4.00	
Stad Zalt Bommel ¹	..	150-200	Stoomv. Mij. "Stad Zalt Bommel" ..	300, 600	P G	X	0.40	4.00	
Stad Zwolle ¹	..	200	Stoomv. Mij. "Stad Zalt Bommel" ..	300, 600	P G	X	0.40	4.00	
Stella ¹	..	200	Kon. Nederl. Stoomboot Mij. ..	300, 600	P G	X	0.40	4.00	
Stuyvesant ¹	..	200-250	Kon. West Ind. Maildienst ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Sunatra PGM ¹	..	100-150	"Nederland" Stoomvaart Mij. ..	300, 600	P G	X	0.40	4.00	
Swarenhondt ¹	..	—	Kon. Paketvaart Maatschappij ..	300, 600	P G	X	0.40	4.00	
Tabahan ¹	..	200	Rotterdamse Lloyd ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Tambora ¹	..	200	Rotterdamse Lloyd ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Tangka	..	40	Navy ..	300	O ⁴	—	—	—	
Tantalus ¹	..	150-200	Stoomv. Mij. Oreaan ..	300, 600	P G	X	0.40	4.00	
Tasman ¹	..	200	Kon. Paketvaart Mij. ..	300, 600	P G	X	0.40	4.00	

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
HOLLAND—contd.									
Walcheren ¹	PFZ	100-150	Stoomv. Mij. Triton	300, 600	P G	X	0.40	4.00	France.
Warszawa	PHX	200	Holland-Amerika Line	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Wassenaar	TYG	150-200	Gebrs. van Uden	300, 600	P G	X	0.40	4.00	
Waterland ¹	PZN	200	Kon. Hollandsche Lloyd	300, 600	P G	X	0.40	4.00	
Westerdijk PGZ ¹	PGZ	200	Holland-Amerika Line	300, 450, 600	P G	X	0.40	4.00	
Westerdijk PZI ¹	PZI	200	Solleveld & V. D. Meer	300, 600	P G	X	0.40	4.00	
Westplein	TZL	200	N. V. Scheepv. Mij. "Millingen"	300, 600	P G	X	0.40	4.00	
Wieldrecht ¹	PYE	200	Ph. Van Ommen	300, 600	P G	X	0.40	4.00	
Willis ¹	PFQ	200	Rotterdamse Lloyd	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	4.00	
Willem V. Driel S R ¹	PHW	100-150	V. Driel's Co.	300, 600	P G	X	0.40	4.00	
Winterswijk ¹	PIS	50-80	Erhardt & Dekkers	300, 600	P G	X	0.40	4.00	
Witte Zee ¹	PIC	75-125	L. Smit & Co.'s Sleepdienst	300, 600	P G	X	0.40	4.00	
Wolt	PBW	150	Navy	300, 600	O	—	—	—	
Yildum ¹	PXM	125	V. Nievelt, Grondriaan Stoom. Mij.	300, 600	P G	X	0.40	4.00	
Yseldijk ¹	PID	150-200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Ysselver	TZL [•]	200	Rott. Alg. Scheepvaart Mij.	300, 600	P G	X	0.40	4.00	
Zaandijk ¹	PIJ	200	Holland-Amerika Line	—	P G	—	0.40	4.00	
Zaandijk ¹	PZO	200	Kon. Hollandsche Lloyd	300, 600	P G	X	0.40	4.00	
Zaanstroom ¹	TVX	200	Holl. Stoomb. Mij.	300, 600	P G	X	0.40	4.00	
Zeehond	PAZ	100	Navy	300, 600	P G	—	—	—	
Zeeland PDA	PDA	150	Stoomv. Mij. Zeeland	300, 500, 600	P R [•]	N [•]	—	—	
Zeeland PAF	PAF	200	Navy	300, 600	O	—	—	—	
Zeeland PZV ¹	PZV	150	Bureau Wylsmuller	300, 600	P G	—	—	—	
Zeelandia ¹	PEI	200-250	Kon. Hollandsche Lloyd	300, 600	P G	N	0.40	4.00	
Zijldijk ¹	TVF	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Zuid-Holland ¹	PZH	200	Scheepv. & Steenk. Mij.	300, 600	P G	X	0.40	4.00	
Zuiderdyk ¹	PHP	200	Holland-Amerika Line	300, 600	P G	X	0.40	4.00	
Zwarte Zee PID ¹	PID	75-125	L. Smit & Co.'s Sleepdienst	300, 600	P G	X	0.40	4.00	
Zwarte Zee PXT ¹	PXT	100-150	Naamloose Vennootschap Zwarte Zee	300, 600	P G	X	0.40	4.00	

Tegucigalpa ¹	VB	—	Vaccaro Bros. & Co.	..	..	—	PG	..	X	0.40	—	1 Operated and controlled by the Radio Corp'n. of America
Yoro ¹ ..	VY	—	Vaccaro Bros. & Co.	..	..	—	PG	..	X	0.40	—	
HONG-KONG												
Lightning ¹	VUL	—	British India S.N. Co.	..	..	—	P	—	X	—	—	1 Operated and controlled by the Marconi International Mar. Com. Co., Ltd., London.
Aspinet ¹	GVF	125	Standard Transport Co., Ltd.	..	..	300, 600	—	—	—	—	—	
Hermeline ¹	VUF	—	Furness, Withy & Co., Ltd.	..	..	—	—	—	—	—	—
Jhangir ¹	BRA	—	Lan Sin Chuen	..	..	—	—	—	—	—	—
Laertes ¹	MYX	—	A. Holt & Co.	..	..	—	—	—	—	—	—
Masconomo ¹	GR	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	1 Operated by Siemens Bros. & Co., Ltd., London.
Massasot ¹	PTB	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Nile VRE ¹	VRE	150	Nile S.S. Co.	..	..	300, 450, 600	PG	..	X	0.40	—	
Onaka ¹	GVF	150	Standard Transport Co., Ltd.	..	..	300, 600	P	..	X	—	—	1 Accounts are settled through Siemens Bros. & Co., Ltd., Woolwich, London
Samoset ¹	NUU	125	Standard Transport Co., Ltd.	..	..	300, 600	P	..	X	—	—	
Satanta ¹	KZS	125	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Sequoya ¹	GSE	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Shabonea ¹	GSS	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Tacoma ¹	GZH	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Tahchee ¹	GSI	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Tunaba ¹	GSG	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Tusculusa ¹	GSD	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Tecumseh ¹	ELR	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Uncus ¹	GSA	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Wabasha ¹	GIN	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
Wapello ¹	—	125	Standard Transport Co., Ltd.	..	..	300, 600	PG	..	X	—	—	
Winamac ¹	GSM	150	Standard Transport Co., Ltd.	..	..	300, 450, 600	PG	..	X	—	—	
IOELAND												
Gullfoss ¹	TFG	200	Eimskipafjelag Isles	..	..	300, 600	P	..	X	0.40	4.00	1 Operated by the owners
INDIA												
Arratoon Apar	VUE	—	Brit. India S.N. Co., Ltd.	..	..	300, 600	PG	..	X	0.40	—	1 Operated and controlled by the owners
Catherine Apar	VUR	—	Brit. India S.N. Co., Ltd.	..	..	300, 600	PG	..	X	0.40	—	1 Operated by the Marconi International Marine Com. Co., Ltd., London
Dera ¹ ..	VUQ	—	Bombay & Persia S.N. Co., Ltd.	..	..	—	—	—	—	—	—
Dufferin ¹ ..	VUB	250	Government	..	..	300, 600, 1,000	PG	..	N	0.40	—	
Gregory Apar ¹	VUF	—	British India S.N. Co.	..	..	300, 600, 1,800	PG	..	N	0.40	—	
Hardinge ¹	VUC	250	Government	..	..	—	—	—	—	—	—
Japan ¹ ..	VUG	—	British India S.N. Co.	..	..	—	—	—	—	—	—
Lightning ¹	VUL	—	British India S.N. Co.	..	..	—	—	—	—	—	—
Loyalty ¹	ZCI	—	Scindia S.N. Co., Ltd.	..	..	—	—	—	—	—	—
Naderi ¹	VUK	—	British India S.N. Co.	..	..	—	—	—	—	—	—
Northbrook ¹	VUD	200	R. Ind. Marine	..	..	300, 430, 600, 1,000	PG	..	N	0.40	—	
Patrick Stewart ¹	VUP	100	Indo-European Tel. Co.	..	..	300, 600	O	..	X	—	—	
Seang Bee ¹ ..	VJO	—	Lim Chin Tsong	..	..	—	—	—	—	—	—
Shuja ¹ ..	VUS	—	Bombay & Persia S.N. Co.	..	..	—	—	—	—	—	—

Ansaldi 31	140	IAP	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi 41	140	ILY	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi 51	140	ILV	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi 61	140	IAC	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi S. Giorgio 11	140	IVI	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi S. Giorgio 21	140	IAH	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Ansaldi S. Giorgio 31	140	IAI	Soc. Nazionale di Nav.	300, 600	P	..	X	0.40
Anteo ..	140	IFH	Navy	300, 600	P	..	X	0.40
Antonietta Accame 1	190	IOF	Luigi Antico Flli. Accame	300, 600	P	..	X	0.40
Antonio 1	140	IFA	Lloyd Mediterraneo	300, 600	P	..	X	0.40
A. Poerio	—	IFP	Navy	—	—	—	—	—
Aquila ..	—	IIP	Navy	—	—	—	—	—
Aquilone	—	IIV	Navy	—	—	—	—	—
Arbione	—	ICF	Navy	—	—	—	—	—
Atlante ..	—	IIB	Navy	—	—	—	—	—
Ardito ..	190	IIR	Navy	300, 600	PG	..	X	0.40
Argentina 1	—	IIR	Flli. Cosulich Trieste	—	—	—	—	—
A. Riboty	140	IFF	Navy	300, 600	P	..	X	0.40
Armando 1	140	ITO	Nav. Generale Italiana	300, 600	P	..	X	0.40
Arnaldo da Brescia 1	190	IMK	Ferrov. dello Stato	300, 600	P	..	X	0.40
Artigliere	—	IIG	Navy	—	—	—	—	—
Ascaro ..	—	IIF	Navy	—	—	—	—	—
Assita 1 ..	110	IOY	Soc. Meritt. Italiana	300, 600	P	..	X	0.40
Aster 1 ..	140	IUY	Edoardo Mazza ..	300, 600	P	..	X	0.40
Atlanta 1	190	IEN	Ferrov. dello Stato	300, 600	P	..	X	0.40
Atlante ..	—	IKW	Navy	—	—	—	—	—
Attualita 1	140	IAR	Lloyd Pacifico	300, 600	P	..	X	0.40
Audace ..	—	IIC	Navy	—	—	—	—	—
Aurania 1	110	IIV	Lloyd Mediterraneo	300, 600	P	..	X	0.40
Balena ..	—	IFW	Navy	—	—	—	—	—
Bagnoli 1	190	IXO	Lloyd Mediterraneo	300, 600	P	..	X	0.40
Barbarigo 1	140	IUZ	S. Ven. Nav. a Vapore	300, 600	P	..	X	0.40
Baron Call 1	140	IXU	Lloyd Triestino ..	300, 600	PG	..	X	0.40
Basilicata	—	IKL	Navy	—	—	—	—	—
Bastia 1	140	ILJ	Ferrov. dello Stato	300, 600	P	..	X	0.40
Battin Accame 1	170	IOD	Salvatore a Emanuele Flli. Accame	300, 600	P	..	X	0.40
Bavonin 1	190	ILB	Columbia Soc. Stato	300, 600	P	..	X	0.40
Belluno 1	100	ITC	Ferrov. dello Stato	300, 600	P	..	X	0.40
Balvedere 1	190	ITX	Flli. Cosulich, S.A.	300, 600	PG	..	N	0.40
Bengasi 1	—	IGI	Navy	—	—	—	—	—
Bengasi 2 1	140	IAY	Servizi Marittimi ..	300, 600	P	..	X	0.40
Berenice 1	170	IYE	Stella Soc. de Nav.	300, 600	P	..	X	0.40
Bersagliere	—	IHH	Navy	—	—	—	—	—
Bertani	—	IJX	Navy	—	—	—	—	—
Bologna 1	190	ITB	La Veloce Soc. de Nav. a Vapore	300, 600	PG	..	N	0.40
Bolsena 1	140	ILA	Servizi Marittimi ..	300, 600	P	..	X	0.40
Bolzaneto 1	110	IOK	Lloyd Mediterraneo	300, 600	P	..	X	0.40
Borea ..	—	III	Navy	—	—	—	—	—
Bormida 1	140	IOO	Servizi Marittimi ..	300, 600	P	..	X	0.40
Brasile 1 ..	190	IED	Soc. Transoceanica	300, 600	PG	..	X	0.40
Brenta 1	190	IAP	Nav. Gén. Italiana	300, 600	P	..	X	0.40
Brento 1	—	IOU	Soc. Amatori Liguri Lombardi	—	—	—	—	—
Brescia ILZ 1	200	ILZ	Ferrov. dello Stato	300, 600	P	..	X	0.40

YES	190	Ferrov. dello Stato		300,000	P G	X	0.40
INE	190	Sicilia		300,000	P G	X	0.40
INP	190	S. An. Adriatica		300,000	P G	X	—
IEN	—	Navy		—	—	—	—
ILI	—	Navy Generale Italiana		—	—	—	—
IUB	—	Navy		—	—	—	—
IFD	—	Navy		—	—	—	—
IKS	—	Navy		—	—	—	—
IFI	—	Soc. Nazionale		300,000	P	X	0.40
IMF	—	Lloyd Mediterraneo		300,000	P	X	0.40
IXH	—	La Polare		300,000	P	X	0.40
IZF	140	Fili. Consulch		300,000	P G	X	0.40
IWM	140	Corrado Andrea		300,000	P	X	0.40
ITC	—	Navy		—	—	—	—
IHD	—	Navy		—	—	—	—
IIK	—	Navy		—	—	—	—
IGJ	—	Navy		—	—	—	—
IOQ	170	Soc. Ital. Ser. Marittimi		300,000	P	X	0.40
ILG	100	Ferrov. dello Stato		300,000	P	X	0.40
IFO	—	Navy		—	—	—	—
IZS	140	Soc. An Nafra (Milano)		300,000	P G	N	0.40
IHE	—	Navy		—	—	—	—
IUH	270	Transatlantica Italiana		300,000	P	X	0.40
IHC	—	Navy		—	—	—	—
IZB	140	La Polare, S.A.		300,000	P	X	0.40
IHL	—	Navy		—	—	—	—
IAX	140	Servizi Marittimi		300,000	P	X	0.40
IEY	140	Trausoceanica		300,000	P	X	0.40
ITD	120	Ferrov. dello Stato		300,000	P	X	0.40
ITK	110	Alta Italia		300,000	P	X	0.40
ITZ	270	Navy Generale Italiana		300,000	P G	N	0.40
IZZ	270	Navy Generale Italiana		300,000	P G	N	0.40
IHB	—	Navy		—	—	—	—
IEF	—	Navy		—	—	—	—
IPA	140	Marittima Italiana		300,000	P	X	0.40
Egadi	—	Navy		—	—	—	—
ICI	170	Lloyd Mediterraneo		300,000	P	X	0.40
ICM	—	Senatore G. Marconi		—	—	—	—
IXX	140	Servizi Marittimi		300,000	P	X	0.40
IWU	—	Fratelli Bozzo		300,000	P	X	0.40
IHW	—	Navy		—	—	—	—
INW	140	Sicilia		300,000	P	X	0.40
IHX	—	Navy		—	—	—	—
IGO	—	Navy		—	—	—	—
IGX	—	Navy		—	—	—	—
IZP	140	Sicilia		300,000	P G	X	0.40
IZX	270	Servizi Marittimi		300,000	P G	X	0.40
IIM	—	Navy		—	—	—	—
IUG	—	Ghirardi Genova		—	—	—	—
IKG	—	Navy		—	—	—	—
IWI	140	Navy Generale Italiana		300,000	P	X	0.40
IKP	—	Navy		—	—	—	—
INQ	140	Sicilia		300,000	P	X	0.40
IVG	140	Ente Trasporto Cotoni		300,000	P	X	0.40
IN	—	Navy		—	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
ITALY—contd.							Francs.	Francs.	
Europa IEE ¹	IEE	270	La Veloce ..	300, 600	P G ..	N	0.40	—	
Europa IJI	IJI	—	Navy	—	—	—	—	—	
Fagernes ¹	IPQ	190	S. Naz. di Navigazione Navy	300, 600	P ..	X	0.40	—	
Falco ..	IMV	190	Marrittimo Italiana	300, 600	P ..	X	0.40	—	
Favignana ¹	IZW	190	Vassallo e Narizzano	300, 600	P ..	X	0.40	—	
Febo ¹ ..	IPF	110	Becchi Calfagno	300, 600	P ..	X	0.40	—	
Fede ¹ ..	IAM	200	Ferrovie dello Stato	300, 600	P G ..	X	0.40	—	
Ferdinando Palasciano ¹	IPT	140	Adria Rome	300, 600	P G ..	X	0.40	—	
Ferenz Ferdinand ¹	IPT	140	Adria Rome	300, 600	P G ..	X	0.40	—	
Ferenz Joseph Kiraly ¹	ILU	200	Ferrovie dello Stato	300, 600	P ..	X	0.40	—	
Ferrara ¹	IVL	190	Alta Italia ..	300, 600	P ..	X	0.40	—	
Fert ¹ ..	IAT	190	Nav. Generale Italiana	—	P G ..	—	0.40	—	
Fiume ¹ ..	IGE	—	Navy	—	—	—	0.40	—	
Flavio Gioja	IFK	—	Navy	—	—	—	0.40	—	
Flegante ..	IFK	—	Navy	—	—	—	0.40	—	
F. Nullo	ILG	—	Navy	—	—	—	—	—	
Francesca ¹	ITQ	140	Fili Cosulich Trieste	300, 600	P G ..	—	0.40	—	
Francesco Ciampa ¹	IWD	110	F. S. Ciampa Piano Sorento	300, 600	P ..	N	0.40	—	
Francesco Furruccio ¹	IMZ	—	Navy	—	—	X	0.40	—	
Fratelli Bandiera ¹	ILX	325	Ferrovie dello Stato	300, 600	—	—	0.40	—	
F. Stocco	IJU	—	Navy	—	—	—	—	—	
Fuciere	IIO	—	Navv	—	—	—	—	—	
Fulmine	IIP	—	Navv	—	—	—	—	—	
G. Abba	IJK	—	Navy	—	—	—	—	—	
Gablonz	IWZ	190	Transatlantica Italiana	300, 600	P G ..	N	0.40	—	
Garibaldi IUA ¹	IUA	190	Transatlantica Italiana	300, 600	P G ..	N	0.40	—	
Garibaldino	IIO	—	Navy	—	—	—	—	—	
Garigliano	IGH	—	Navy	—	—	—	—	—	
G. Carini	IJW	—	Navy	—	—	—	—	—	
Gerolamo Ullao	IEJ	110,	Ferrovie dello Stato	300, 600	P ..	X	0.40	—	
Giannulir	IIF	—	Navy	—	—	—	—	—	
Giglio ..	IXK	140	Mazza Edoardo	300, 600	P ..	X	0.40	—	
Giovanni Bausan	IXK	—	Navy	—	—	—	—	—	
Giovanni C	IWO	110	Lloyd Mediterraneo	300, 600	P ..	X	0.40	—	
Giove ..	IMG	240	Ferrovie dello Stato	300, 600	P ..	X	0.40	—	
Giuditta ¹	IWS	110	Ravano e Corrado ..	300, 600	P G ..	X	0.40	—	
Giuliana	IGN	—	Navv	—	—	—	0.40	—	

Giulio Cesare IHE	IHE	110	Navy	P. Vitulli e Montaruli	300, 600	P G	X	0.40
Giulio Cesare IXR ¹	IXR	110	Fili. Berardo	300, 600	P G	—	—	—
Giuseppe Berardo ¹	IXI	270	Transatlantica Italiana	300, 600	P	—	N	0.40
Giuseppe Verdi ¹	IUV	290	Hardi Ernesto di	300, 600	—	—	X	0.40
Giuseppe Verdi ¹	IOI	—	Navy	—	—	—	—	—
G. La Masa	IIV	—	Navy	—	—	—	—	—
G. Misori	IOO	—	Ferrov. dello Stato	300, 600	P	—	X	0.40
Goffredo Mameli ¹	IUD	110	Soc. Naz. di Navigazione	300, 600	P	—	X	0.40
Goltz	IKU	140	Navy	—	—	—	—	—
Gomaga ¹	IML	—	Navy	—	—	—	—	—
G. Pepe	IFB	—	Navy	—	—	—	—	—
Granatiere	IIR	—	Navy	—	—	—	—	—
Grazz ¹	IPD	190	Lloyd Triestino	300, 600	P G	—	X	0.40
Helouan ¹	IIV	190	Lloyd Triestino	300, 600	P G	—	N	0.40
Hungaria ¹	IVK	190	Lloyd Triestino	300, 600	P G	—	X	0.40
Iberia ¹	IPC	—	Fed. Cons. Agrari	—	—	—	—	—
Ida ¹	IWB	140	Soc. It. Arm. e Navigazione	300, 600	P	—	X	0.40
Impavido	IIV	—	Navy	—	—	—	—	—
Indiana ¹	IYI	190	Navy Generale Italiana	300, 600	P G	—	N	0.40
I. Nievo	IIL	—	Navy	—	—	—	—	—
Indomito	IIS	—	Navy	—	—	—	—	—
Innsbruck ¹	IPV	190	Lloyd Triestino	300, 600	P G	—	X	0.40
Insidioso	IIT	—	Navy	—	—	—	—	—
Intrepido	IIU	—	Navy	—	—	—	—	—
Inde	IKT	—	Navy	—	—	—	—	—
Iris ¹	IOZ	140	Edoardo Marza	300, 600	P	—	X	0.40
Irequieto	IIX	—	Navy	—	—	—	—	—
Ischia ¹	INZ	190	Marittima Italiana	300, 600	P	—	X	0.40
Italia IHG	—	—	—	—	—	—	—	—
Italia IZI ¹	IZI	190	Transoceanica Soc. Italiana	300, 600	P G	—	N	0.40
Istria ¹	ITV	140	Sicilia Soc. di Nav.	300, 600	P	—	X	0.40
Italo ¹	IUF	140	Navy Generale Italiana	300, 600	P	—	X	0.40
Italo ¹	IUV	190	Soc. Nav. Libera Iriestina	300, 600	P	—	X	0.40
Karia ¹	IPL	110	Benedetto Lagorina	300, 600	—	—	—	—
Lafor ¹	—	—	—	—	—	—	—	—
Lamia L ¹	IIV	—	Navy	—	—	—	—	—
Lampo IIV	ILL	190	Columbia Soc.	300, 600	P	—	X	0.40
Lampo ILL ¹	ILL	—	Navy	—	—	—	—	—
Landere	IIZ	—	Navy	—	—	—	—	—
Laura ¹	ITT	140	Vincenzo de Luca	300, 600	P	—	X	0.40
Legnano ¹	IUL	190	Ferrov. dello Stato	300, 600	P	—	X	0.40
Leopold ¹	IXA	140	Lloyd Triestino	300, 600	P G	—	X	0.40
Lepanto ¹	IXE	140	Soc. Venez. di Nav. a Vapore	300, 600	P	—	X	0.10
Lete	IFI	—	Navy	—	—	—	—	—
Libia	IKH	—	Navy	—	—	—	—	—
Liguria ¹	IKQ	—	Navy	—	—	—	—	—
Livietta ¹	IKL	110	Dall'Orso & Co.	300, 600	P	—	X	0.40
Lombardia	IKU	—	Navy	—	—	—	—	—
Loredano ¹	IUX	140	Soc. Ven. di Nav. a Vapore	300, 600	—	—	—	—
Lucania I ¹	IPI	190	Soc. Lucania	300, 600	P	—	X	0.40
Luciano Manara ¹	IEI	110	Ferrov. dello Stato	300, 600	—	—	—	—
Luigino Accame ¹	IVB	140	Soc. Maremol di Nav.	300, 600	P	—	X	0.40
Maddalena ¹	IWK	—	Gianni Canali	—	—	—	—	—
Maiella ¹	ILN	190	Ferrov. dello Stato	300, 600	P	—	X	0.40
Marco Minghetti ¹	INH	140	Sicilia Soc. di Nav.	300, 600	P	—	X	0.40
Marco Polo	IGY	—	Navy	—	—	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
ITALY—contd.							Francs.	Francs.	
Maria C. ¹	IYW	140	Odero Attilio	300, 600	P	X	0.40	—	
Marina IVN ¹	IVN	190	Libera Trieste	300, 600	P	X	0.40	—	
Marina O. IMO ¹	IMO	110	N. Odero & Co.	300, 600	P	X	0.40	—	
Marquitta ¹	IWR	140	Lloyd Mediterraneo	300, 600	P	X	0.40	—	
Marsala	IKR	—	Navy	—	—	—	—	—	
Marsala II ¹	IPS	140	Ferrov. dello Stato	300, 600	P	X	0.40	—	
Marta ¹	IVF	140	Soc. Ligure di Armamento	300, 600	P	X	0.40	—	
Mazocco	ITZ	190	Soc. An. Motovelieri	300, 600	P	X	0.40	—	
Masanello ¹	IEW	140	Transoceanica	300, 600	P	X	0.40	—	
Medici	IKB	—	Navy	—	—	—	—	—	
Melpomene ¹	IVU	—	—	—	—	—	—	—	
Meran ¹	IPZ	140	Sicilia Soc. di Nav.	300, 600	P	X	0.40	—	
Meran ¹	IVS	—	—	—	—	—	—	—	
Metlioni ¹	IXO	—	Devoto Clorido	—	—	—	—	—	
Michelangelo ¹	IXM	110	Dall'Oso & Co.	300, 600	P	X	0.40	—	
Milano ¹	INM	190	Servizi Marittimi	300, 600	P	X	0.40	—	
Milazzo ¹	IEP	190	Transoceanica	300, 600	P	X	0.40	—	
Minerva IXK	IKX	—	Navy	—	—	—	—	—	
Minerva IXJ ¹	IXJ	140	Soc. Ligure di Armamento	300, 600	P	X	0.40	—	
Misurata	IGP	—	Navy	—	—	—	—	—	
Moncalieri ¹	IWW	190	Lloyd Sabaud	300, 600	P	X	0.40	—	
Moncenisio ILO ¹	ILO	190	Ferrov. dello Stato	300, 600	P	X	0.40	—	
Moncenisio IXT ¹	IXT	110	Alta Italia	300, 600	P	X	0.40	—	
Monginevro	ITG	170	Alta Italia	300, 600	P	X	0.40	—	
Montebello	IKZ	—	Navy	—	—	—	—	—	
Monte Bianco ¹	ILD	190	Ferrov. dello Stato	300, 600	P	X	0.40	—	
Monte Cristo ¹	IVJ	190	Lloyd Sabaud	300, 600	P	X	0.40	—	
Monte Grappa ¹	IRB	140	Cons. Venez. di Arm. e Navigaz.	300, 600	P	X	0.40	—	
Montello ¹	INA	140	Cons. Venez. di Arm. e Navigaz.	300, 600	P	X	0.40	—	
Montenegro ¹	IMM	190	Servizi Marittimi	300, 600	P	X	0.40	—	
Montrosa ¹	ILW	190	Ferrov. dello Stato	300, 600	P	X	0.40	—	
Monviso IIV ¹	ILV	190	Ferrov. dello Stato	300, 600	P	X	0.40	—	
Monviso ITH ¹	ITH	110	Alta Italia	300, 600	P	X	0.40	—	
M. Verderame	IVV	—	—	—	—	—	—	—	
Napoli	IHO	—	Navy	—	—	—	—	—	
Narenta ¹	IVL	190	Libera Trieste	300, 600	P	X	0.40	—	
Narato ¹	IVK	110	Lavarello eredi di G. Lavarello	300, 600	P	X	0.40	—	
Narato Sauro ¹	IVL	190	Transatlantica Italiana	300, 600	P	X	0.40	—	
Nembo	IJA	—	Navy	—	—	—	—	—	

Nemi ¹	IMW	140	Servizi Marittimi ..	300, 800	P	..	X	0.40
Nettuno ¹	ILE	240	Ferrovii dello Stato	300, 600	P	..	X	0.40
N. Fabrizi	IJZ	—	Navy	—	—	—	—	—
Nibbio	IJR	—	Navy	—	—	—	—	—
Nicolas ¹	IVK	140	Soc. Nazionale di Navigaz.	300, 600	P	..	X	0.40
Nicola ²	IUN	110	N. Odero & Co.	300, 600	P	..	X	0.40
Nilos ¹	INB	110	Ferrovii dello Stato	300, 600	P	..	X	0.40
Nilfa ¹	ITV	110	Vincenzo De Luca..	300, 600	—	—	—	—
Nino Bixio	IKF	—	Navy	—	—	—	—	—
Nitor ¹	ION	—	Fili. Lagorara	—	—	—	—	—
Oceano ¹	IPJ	110	Lloyd Mediterraneo	300, 800	P G	..	X	0.40
Oldenburg ¹	IND	—	Ferrovii dello Stato	—	—	—	—	—
Ombia ¹	IVM	190	Libera Irtistina	300, 800	—	—	—	—
Onoria ¹	IOV	—	General Steamship agy.	300, 600	P	..	X	0.40
Orione ²	INF	190	Marittima Italiana	300, 600	P	..	X	0.40
Orsello ¹	IYC	140	Soc. Ven. di Nav. a Vapore	300, 600	—	—	—	—
Orsini V	IFS	—	Navy	—	—	—	—	—
Ostro	IJB	—	Navy	—	—	—	—	—
Padova ¹	IUT	190	Ferrovii dello Stato	300, 600	P	..	X	0.40
Palacky ¹	IXA	140	Lloyd Triestino	300, 600	P G	..	X	0.40
Paraguay ¹	IMP	140	Sicilia Soc. di Nav.	300, 600	P	..	X	0.40
Partenope	IKY	—	Navy	—	—	—	—	—
Patras ¹	IWF	—	Angelo Denegri	300, 600	P	..	X	0.40
P. Bronzetti	IJN	—	Navy	—	—	—	—	—
Pegli ¹	IOT	140	Soc. an. Genovese Arm. e Trasp..	300, 600	P	..	X	0.40
Pesaro ¹	ILM	250	Ferrovii dello Stato	300, 600	P G	..	X	0.40
Piave IVX ¹	IVX	190	Soc. Prodotti Ch. Colla e Conc.	300, 600	P	..	X	0.40
Piave IEL ¹	IEL	190	Roma	300, 600	P	..	X	0.40
Piemonte IKI	IKI	—	Nav. Generale Italiana	—	—	—	—	—
Piemonte INX ¹	INX	140	Sicilia Soc. di Nav.	300, 600	P	..	X	0.40
Pietro Calvi ¹	IWV	140	Ferrovii dello Stato	300, 600	—	—	—	—
Piana ¹	IAE	140	Lloyd Triestino	300, 600	P G	..	X	0.40
Pisa	IHR	—	Navy	—	—	—	—	—
Pola ¹	INY	140	Sicilia Soc. di Nav.	300, 600	P	..	X	0.40
Polytesia ¹	INJ	—	Ferrovii dello Stato	300, 600	P	..	X	0.40
Pontiere	IXQ	110	Siciliano Censini	300, 600	P	..	X	0.40
Porto di Alessandretta ¹	IJC	—	Navy	—	—	—	—	—
Porto di Savona ¹	INT	190	Marittima Italiana	300, 600	P	..	X	0.40
Posilipo ¹	INV	190	Marittima Italiana	300, 600	P	..	X	0.40
Praga ¹	IEV	190	Transoceanica	300, 600	P	..	X	0.40
Presidente Wilson ¹	IPY	140	Lloyd Triestino	300, 600	P G	..	X	0.40
Primula ¹	IOB	270	Fili. Cosulich	300, 600	P G	..	X	0.40
Primula ILO	ILI	190	Bassani Ettore	300, 600	P	..	X	0.40
Principa di Udine ¹	INO	140	Edoardo Marza	300, 600	P	..	X	0.40
Principessa Jolanda ¹	IYU	270	Lloyd Sabauda	300, 600	P G	..	X	0.40
Principessa Mafalda ¹	IOG	110	Soc. Ven. di Nav. a Vapore	300, 600	P	..	X	0.40
Prometeo	IYM	270	Nav. Generale Italiana	300, 600	P G	..	X	0.40
Proclida ¹	IKC	—	Navy	—	—	—	—	—
Puglia	IJD	190	Nav. Generale Italiana	300, 600	P	..	X	0.40
Quarto	IKK	—	Navy	—	—	—	—	—
Racconigi ¹	IKD	—	Navy	—	—	—	—	—
Re d'Italia ¹	IZI	110	Lloyd Sabauda	300, 600	P G	..	X	0.40
Regina d'Italia ¹	IVR	190	Lloyd Sabauda	300, 600	P G	..	X	0.40
	INI	190	Lloyd Sabauda	300, 600	P G	..	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
ITALY—contd.									
Regina Elena	IHQ	—	Navv	—	—	—	—	—	—
Resurrezione ¹	IVY	110	La Polare S.A.	300, 600	P	X	0.40	—	—
Re Umberto	IHK	—	Navv	—	—	—	—	—	—
Re Vittorio ¹	IZV	270	Nav. Generale Italiana	300, 600	P G	N	0.40	—	—
Rodi ¹	IXN	190	Sicilia Soc. di Nav.	300, 600	P	X	0.40	—	—
Rodosto ¹	IVB	140	Soc. Roma di Nav.	300, 600	P	X	0.40	—	—
Roma IHP	IHP	—	Navv	—	—	—	—	—	—
Roma INR ¹	INR	190	Soc. Marittima Italiana	300, 600	P	X	0.40	—	—
Roma 2 ¹	IVH	190	Sicilia	300, 600	P	X	0.40	—	—
Rosalia ¹	ITE	110	Lloyd Adriatico	300, 600	P	X	0.40	—	—
Rosario ¹	IXX	190	Soc. Roma di Nav.	300, 600	P	X	0.40	—	—
Rossino Orlando ¹	IAL	190	Lloyd Mediterraneo	300, 600	P	X	0.40	—	—
Rossignau ¹	IAM	140	Roma Soc. di Nav.	300, 600	P	X	0.40	—	—
Rovato ¹	IYJ	190	Soc. Roma di Nav.	300, 600	P	X	0.40	—	—
Robbella ¹	IZN	190	Soc. Roma di Nav.	300, 600	P	X	0.40	—	—
Roverito ¹	IEG	190	Soc. Roma	300, 600	P	X	0.40	—	—
Rovigno ¹	IOA	190	Soc. Roma	300, 600	P	X	0.40	—	—
R. Pilo	IJJ	—	Navv	—	—	—	—	—	—
Salina ¹	IVR	190	Libora Triestina	300, 600	—	—	—	—	—
Salvatore ¹	IWA	110	Angelo Gazzolo	300, 600	P	X	0.40	—	—
S. Gennaro ¹	ITF	270	Transoceanica	300, 600	P G	N	0.40	—	—
S. Giorgio IHU	IHU	—	Navv	—	—	—	—	—	—
S. Giorgio IMS ¹	IMS	140	Soc. Marittima Italiana	300, 600	P	X	0.40	—	—
S. Giorgio IEA ¹	IEA	190	Transoceanica	300, 600	P G	N	0.40	—	—
S. Giovanni ¹	IEC	190	Transoceanica	300, 600	P G	N	0.40	—	—
S. Giuseppe ¹	IEK	190	Ravano & Carrodo	300, 600	P	X	0.40	—	—
S. Glusto ¹	IPW	190	Ferrovii dello Stato	300, 600	—	—	—	—	—
S. Marco	IHT	—	Navv	—	—	—	—	—	—
S. Marco	IUB	190	S. A. di Nav. Adriatica	300, 600	P	X	0.40	—	—
S. Rosore ¹	IME	190	Lloyd Sabauda	300, 600	P	X	0.40	—	—
S. Sordani ¹	IRH	—	Navv	—	—	—	—	—	—
Sardagna IHM	IRH	190	Soc. Servizi Marittimi	300, 600	P	X	0.40	—	—
Sardagna INS ¹	INS	190	Soc. Velece Soc. di Nav.	300, 600	P	X	0.40	—	—
Savola IEH ¹	IEH	140	Soc. Naz. di Navigazione.	300, 600	P	X	0.40	—	—
Savola I ¹	IZH	140	Soc. Naz. di Navigazione.	300, 600	P	X	0.40	—	—
Scampolo ¹	IYW	140	Lloyd Sabauda	300, 600	P	X	0.40	—	—
Scallini ¹	IVC	110	Marittima Italiana	300, 600	P	X	0.40	—	—
Servitia ¹	IMU	190	Marittima Italiana	300, 600	P	X	0.40	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
ITALY—contd.									
Vittorio Emanuele	IHN	—	Navy	—	—	—	—	—	¹ Operated by the Ministry of Communications ² Operated and controlled by the owners ³ Correspondence restricted to radiotelegrams exchanged with Chosen lighthouse and Japanese warships ⁴ Cable ships with special service relating to the vessels
Vittorio Veneto¹	IUC	190	La Veloce Soc. di Nav.	300, 600	P	X	—	—	
Voltorno¹	IEQ	190	Transoceanica	300, 600	P	X	0.40	—	
Vulcano IGL	IGL	—	Navy	—	—	—	—	—	
Vulcano IZO¹	IZO	190	Nav. Generale Italiana	300, 600	P	X	0.40	—	
Wardha¹	ILQ	140	Corrado Andrea	300, 600	P	X	0.40	—	
Zefiro	IJE	—	Navy	—	—	—	—	—	
Zenson	IGU	—	Navy	—	—	—	—	—	
Zovetto¹	IWK	—	A. Parodi	300, 600	P	X	0.40	—	
JAPAN									
Adzuma	JRD	—	Navy	—	O	—	—	—	
Africa Maru²	JDF	Day 400	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Aikoku Maru²	JDT	Day 400	Uchida Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Akashi	JLM	—	Navy	—	O	—	—	—	
Aki	JGK	Day 500	Navy	—	O	—	—	—	
Aki Maru¹	JAI	Night 1,500	Nippon Yusen Kaisha	300, 600	P G	N	0.40	—	
Akita Maru²	JCB	Day 400	Nippon Yusen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Akitushima	IUQ	—	Navy	—	O	—	—	—	
Alaska Maru²	JAL	Day 400	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Alps Maru²	JBP	Day 300	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Altai Maru²	JFE	Day 300	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Amagisan Maru ¹	JYG	Day 400	Mitoui Bussan Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100	0.40	—
Amazon Maru ²	JAZ	Day 300	Osaka Shosen Kaisha	..	..	300, 600	P G	..	1400 to 1700 2000 to 2400	0.40	—
America Maru ¹	JAC	Day 400 Night 1,000	Osaka Shosen Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Amur Maru ²	JAR	Day 300	Osaka Shosen Kaisha	..	•	300, 600	P G	..	0800 to 1100 1400 to 1700	0.40	—
Andes Maru ²	JFU	Day 300	Osaka Shosen Kaisha	..	..	300, 600	P G	..	2000 to 2400 0800 to 1100 1400 to 1700	0.40	—
Annan Maru ²	JDN	Day 200	Osaka Shosen Kaisha	..	..	300, 600	P G	..	2000 to 2400 0800 to 1100	0.40	—
Anyo Maru ¹	JAY	Day 400	Toyo Kisen Kaisha	..	..	300, 600	P G	..	0800 to 1100	0.40	—
Arabia Maru ¹	JEG	Day 400	Osaka Shosen Kaisha	..	..	300, 600	P G	..	1400 to 1700 2000 to 2400	0.40	—
Asahi ¹	JGB	—	Navy	..	..	—	O	..	—	—	—
Asama ¹	JRA	—	Navy	..	..	—	O	..	—	—	—
Aso ¹	JRL	—	Navy	..	..	—	O	..	—	—	—
Atagosan Maru ²	JYA	Day 400	Mitsui Bussan Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700	0.40	—
Ataka Maru ²	JBD	Day 400	Tatsuuma Shokai	..	..	300, 600	P G	..	2000 to 2400 0800 to 1100	0.40	—
Atsuta Maru ¹	JAT	Day 430 Night 1,200	Nippon Yusen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700	0.40	—
Awa Maru ¹	JAW	Day 400	Nippon Yusen Kaisha	..	..	300, 600	P G	..	2000 to 2400	0.40	—
Ayaha ²	JYV	Day 400	Tatsuuma Kisen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700	0.40	—
Azuma Maru ²	JBM	Day 400	Tokyo Salvage Co.	..	..	300, 600	P G	..	2000 to 2400 0800 to 1100	0.40	—
Azumasan Maru ²	JBS	Day 400	Mitsui Bussan Kaisha	..	..	300, 600, 1,800	P G	..	1400 to 1700 0800 to 1100	0.40	—
Batavia Maru ¹	JIC	Day 200	Osaka Shosen Kaisha	..	..	300, 600	P G	..	2000 to 2400 0800 to 1100	0.40	—
Bingo Maru ¹	JBG	Day 300 Night 1,000	Nippon Yusen Kaisha	..	..	300, 600	P G	..	1400 to 1700 0800 to 1100	0.40	—
Bombay Maru ²	JHU	Day 400	Nippon Yusen Kaisha	..	..	300, 600	P G	..	2000 to 2400	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio telegram.	
JAPAN—contd.									
Borneo Maru JCL ¹ ..	JCL	Day 500	Osaka Shosen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1400 1400 to 1700 2000 to 2400	France. 0.40	—	
Borneo Maru JPB ¹ ..	JPB	Day 400	Nanyo Yusen Kaisha ..	300, 600, 1,800	P G ..	N	0.40	—	
Boston Maru ¹ ..	JMC	Day 200	Kokusai Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Burma Maru ¹ ..	JYY	Day 200	Osaka Shosen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Buyo Maru ¹ ..	JPX	Day 200	Asano Zosenjo ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Calcutta Maru ¹ ..	JBC	Day 400	Nippon Yusen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Canada Maru ¹ ..	JCD	Day 550 Night 1,200	Osaka Shosen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Capetown Maru ¹ ..	JBE	Day 400	Kawasaki Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Celebes Maru ¹ ..	JCE	Day 500	Kawasaki Kisen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Ceylon Maru ¹ ..	JDW	Day 400	Nippon Yusen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Chefoo Maru ¹ ..	JKC	Day 200	Nippon Yusen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Chicago Maru ¹ ..	JCC	Day 350 Night 1,200	Osaka Shosen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Chifuku Maru ¹ ..	JHZ	Day 500	Kawasaki Zosenjo ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Chihaya.. Chikuma	JWB JLG	— —	Navy Navy	— —	O .. O ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40 —	— —	

Chitose ..	ILB	—	Navy	..	—	O	..	—	—	—
Chiyoda	JUP	Day 200	Navy	..	300, 600, 1,800	O	..	0800 to 1100	—	—
Chosen Maru *	JPV	Day 400	Osaka Shosen Kaisha	..	300, 600	P G	..	1400 to 1700	0.40	—
Choyo Maru *	JOY		Toyo Kisen Kaisha	..		P G	..	2000 to 2400	0.40	—
				..	300, 600		..	0800 to 1100		
Daibu Maru *	JEU	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G	..	1400 to 1700	0.40	—
				..			..	2000 to 2400		
Delagoa Maru *	JDI	Day 400	Nippon Yusen Kaisha	..	300, 600	P G	..	0800 to 1100	0.40	—
				..			..	1400 to 1700		
Durban Maru *	JKQ	Day 400	Nippon Yusen Kaisha	..	300, 600	P G	..	2000 to 2400	—	—
				..			..	0800 to 1100		
Eftuku Maru *	JFG	Day 400	Kawasaki Dockyard Co.	..	300, 600	P G	..	1400 to 1700	0.40	—
				..			..	2000 to 2400		
Fuji ..	JUC	—	Navy	..	—	O	..	—	—	—
Fukui Maru *	JVT	Day 200	Uchida Kisen Kaisha	..	300, 600	P G	..	0800 to 1100	0.40	—
				..			..	1400 to 1700		
Fukuyou Maru *	JKV	Day 400	Nippon Kaibun Kaisha	..	300, 600	P G	..	2000 to 2400	0.40	—
				..			..	0800 to 1100		
Fushimi ..	JWJ	—	Navy	..	—	O	..	—	—	—
Fushimi Maru *	JFM	Day 430 Night 1,200	Nippon Yusen Kaisha	..	300, 600, 1,800	P G	..	1400 to 1700	0.40	—
				..			..	2000 to 2400		
Fuso ..	JGN	—	Navy	..	—	P G	..	—	—	—
Ganges Maru *	JEP	Day 200	Osaka Shosen Kaisha	..	300, 600	P G	..	0800 to 1100	0.40	—
				..			..	1400 to 1700		
Genchu Maru *	JHD	Day 400	Uyenishi Kisen Kaisha	..	300, 600, 1,800	P G	..	2000 to 2400	0.40	—
				..			..	0800 to 1100		
Genmei Maru *	JBN	Day 400	Uyenishi Kisen Kaisha	..	300, 600	P G	..	1400 to 1700	0.40	—
				..			..	2000 to 2400		
Genoa Maru *	JSL	Day 400	Nippon Yusen Kaisha	..	300, 600	P G	..	0800 to 1100	0.40	—
				..			..	1400 to 1700		
Genyel Maru *	JIN	Day 200	Uyenishi Kisen Kaisha	..	300, 600	P G	..	2000 to 2400	0.40	—
				..			..	0800 to 1100		
Hakata Maru *	JPK	Day 400	Nippon Yusen Kaisha	..	300, 600, 1,800	P G	..	1400 to 1700	0.40	—
				..			..	2000 to 2400		
Hakodate Maru *	JMB	Day 400	Nippon Yusen Kaisha	..	300, 600	P G	..	0800 to 1100	0.40	—
				..			..	1400 to 1700		
Hakushika Maru *	JBX	Day 400	Tatsunuma Kisen Kaisha	..	300, 600, 1,800	P G	..	2000 to 2400	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
JAPAN—contd.							Francs.	Francs.	
Hanasaki Maru ²	JCF	Day 200	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Harbin Maru ¹	JHB	Day 450 Night 1,200	Osaka Shosen Kaisha ..	300, 600	P G ..		0.40	—	
Haruna Haruna Maru ² ..	JGX JPH	Day 200	Navy Tokio Salvage Kaisha ..	— 300, 600	— P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	— 0.40	—	
Hashidate Hawaii Maru ¹ ..	JUO JHW	— Day 450 Night 1,000 100	Navy Osaka Shosen Kaisha ..	— 300, 600, 1,800	O P G ..		— 0.40	—	
Hayafori Maru ¹	JHY	Day 400	Ministry of Agriculture & Commerce	300, 600	P G ..	N	0.40	—	
Heijin Maru ² ..	JIV	Day 400	Taiyo Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Heimei Maru ²	JKP	Day 400	Taiyo Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Heinan Maru ²	JEB	Day 400	Taiyo Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Hidson Maru ² ..	JBO	Day 400	Tatsuma Kisen Kab. Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Hiei Himalaya Maru ²	JGV JFN	— Day 400	Navy Osaka Shosen Kaisha ..	— 300, 600	O P G ..		— 0.40	—	
Hirano Maru ¹ ..	JHR	Day 400 Night 1,200	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40	—	
Hirato ..	IJJ	—	Navy	—	O		—	—	
Huga ..	JGY	—	Navy	—	O		—	—	
Hizen ..	JGD	—	Navy	—	O		—	—	

Hoisan Maru *	JFQ	Day 400	Mitsui Bussan Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700	0.40
Hofuku Maru *	JHM	Day 500	Kawaski Zosenjo	..	300, 600	P G	0800 to 1100 1400 to 1700	0.40
Hokkai Maru *	JYP	Day 400	Meiji Kaiun Kabushaki Kaisha	..	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Hong Kong Maru *	JHN	Day 300 Night 1,000	Osaka Shosen Kaisha	..	300, 600	P G	N	0.40
Horaisan Maru *	JBj	Day 400	Mitsui Bussan Kaisha	..	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Hozan Maru *	JYZ	Day 400	Osaka Shosen Kaisha	..	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Hwang Ping *	JDL	Day 200	Nippon Yusen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Ibuki ..	JGT	—	Navy	..	—	O	—	—
Idzumo ..	JRG	Day 330	Navy	..	—	O	—	—
Iki Maru *	JIL	Night 1,000	Imperial Government Railways	..	300, 600, 1,800	P G	N	0.40
Ikoma ..	JGQ	—	Navy	..	—	O	—	—
Ikomasan Maru *	JBV	Day 400	Mitsui Bussan Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Inaba Maru *	JIB	Day 450 Night 1,200	Nippon Yusen Kaisha	..	300, 600, 1,800	P G	N	0.40
Inaho Maru *	JFB	Day 400	Itaya Shosen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Indo Maru *	JDS	Day 400	Osaka Shosen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Indus Maru *	JCR	Day 200	Osaka Shosen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Ise	JGP	—	Navy	..	—	O	—	—
Italy Maru *	JAH	Day 400	Kawasaki Kisen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Itsukushima	JUN	—	Navy	..	—	O	—	—
Iwami ..	JUD	—	Navy	..	—	O	—	—
Iwate ..	JRF	—	Navy	..	—	O	—	—
Iyo Maru *	JFO	Day 400	Nippon Yusen Kaisha	..	300, 600, 1,800	P G	N	0.40
Java Maru *	JDU	Day 400	Osaka Shosen Kaisha	..	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40

Ship Stations—Continued

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
JAPAN—contd.							Francs.	Francs.	
Jinsen Maru ² ..	JDZ	Day 400	Nippon Yusen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Jinsho Maru ² ..	JIQ	Day 400	Taiyo Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kaga Maru ² ..	JPG	Day 400	Nippon Yusen Kaisha ..	300, 800, 1,800	P G ..	N	0.40	—	
Kagi Maru ¹ ..	JKG	Day 400 Night 1,000	Osaka Shosen Kaisha ..	300, 800	P G ..	N	0.40	—	
Kaian Maru ² ..	JIP	Day 400	Katsuta Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Katei Maru ² ..	JFF	Day 400	Katsuta Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kaifuku Maru ² ..	JBF	Day 400	Katsuta Kisen Kaisha ..	300, 800, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kaigen Maru ² ..	JAQ	Day 150	Mitsui Bussan Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kaikyu Maru ² ..	JKK	Day 400	Katsuta Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kaisho Maru ² ..	JEO	Day 400	Katsuta Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kamakura Maru ² ..	JPR	Day 400	Nippon Yusen Kaisha ..	300, 800, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kamiji Maru ² ..	JKJ	Day 200	Teikoku Kisen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kano Maru ¹ ..	JKA	Day 450 Night 1,200	Nippon Yusen Kaisha ..	300, 800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Kanagawa Maru ²	..	JNA	400	Nippon Yusen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Karachi Maru ²	..	JKH	Day 500	Kawasaki Kisen Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Karasaki Kasado Maru ¹	..	JUV JKT	— Day 300 Night 1,000	Navy Osaka Shosen Kaisha	..	..	— 300, 600	O P G	..	— N	— 0.40	—
Kashima Kashima Maru ¹	..	JCG JKX	— Day 450 Night 1,200	Navy Nippon Yusen Kaisha	..	..	— 300, 600, 1,800	O P G	..	— N	— 0.40	—
Kasuga Katori Katori Maru ¹	..	JRI JGF JKR	— — Day 450 Night 1,200	Navy Navy Nippon Yusen Kaisha	..	..	— 300, 600, 1,800	O O P G	..	— — N	— — 0.40	—
Kawachi Maru ²	..	JPC	Day 200	Nippon Yusen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kayo Maru ¹	..	JKO	Day 250 Night 800	Oaki Goshi Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Keifuku Maru ²	..	JHT	Day 400	Kawasaki Zosenjo	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Keishin Maru ²	..	JCK	Day 400	Tatsuuma Shokai	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kibi Maru No. 6 ²	..	JHP	Day 400	Toiyosaki Kisen Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kifuku Maru ²	..	JHK	Day 400	Kawasaki Dockyard Co.	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kimi Maru ²	..	JHS	Day 400	Kobe Shosen Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kinkasan Maru ²	..	JYK	Day 400	Mitsui Bussan Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kirin Maru ²	..	JDX	Day 200	Nippon Yusen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kirishima	..	JGW	—	Navy	..	..	—	—	..	—	—	—
Kishun Maru ²	..	JFH	Day 200	Tatsuma Kisen Kabushiki Kaisha	..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Kitano Maru ¹	..	JKN	Day 450 Night 1,200	Nippon Yusen Kaisha	..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—

Ship Stations—Continued

Ship Stations—Continued

Telegraphy and Telephony

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
JAPAN—contd.									
Kiyo Maru ¹	JKY	Day 250 Night 800	Toyo Kisen Kaisha	300, 600	P G	N	Francs. 0.40	—	
Koan Maru ²	JFO	Day 400	Katsuda Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kobe Maru ¹	JKB	Day 300 Night 1,000	Nippon Yusen Kaisha	300, 600	P G	N	0.40	—	
Koei Maru ²	JEK	Day 400	Hiromi Shoji Kaisha	300, 600	P G	0800 to 0100 1400 to 1700 2000 to 2400	0.40	—	
Kofuku Maru J	JBQ	Day 400	Hiromi Shoji Kaisha	300, 600	P G	0800 to 0100 1400 to 1700 2000 to 2400	0.40	—	
Kofuku Maru JFL ²	JFL	Day 500	Kawasaki Dockyard Co.	300, 600	P G	0800 to 0100 1400 to 1700 2000 to 2400	0.40	—	
Komagata Maru ²	JDV	Day 300	Yamashita Kamesaburo	300, 600	P G	0800 to 0100 1400 to 1700 2000 to 2400	0.40	—	
Komahashi	JUU	—	Navy	—	O	—	—	—	
Koma Maru ¹	JKL	Day 400 Night 1,200	Imperial Government Railways	300, 600, 1,800	P G	N	0.40	—	
Konan Maru ²	JHA	Day 400	Kobe Sambashi Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kongo	JGU	—	Navy	—	O	—	—	—	
Kongosan Maru ²	JYQ	Day 400	Mitsui Bussan Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Korea Maru ²	JYL	Day 500	Toyo Kisen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Kosai Maru ²	JKS	Day 120 Night 1,200	Chosen Government	300, 600, 1,800	P G	N	0.40	—	
Koshu Maru ²	JAV	Day 400	Kobe Sambashi Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Koshun Maru ²	JAV	Day 400	Kobe Sambashi Kaisha	..	300, 600	PG	..	1400 to 1700	—
Kotsu Maru ²	JIG	Day 400	Hiroimi Shoji Kaisha	..	300, 600	PG	..	2000 to 2400	0.40
Koyo Maru ²	JKD	Day 400	Toyo Kisen Kaisha	..	300, 600	PG	..	1400 to 1700	0.40
Kuma .. Kumano Maru ²	JLA JKF	— Day 200	Navy .. Nippon Yusen Kaisha	..	— 300, 600	O PG	..	—	—
Kunajiri Maru ²	JKU	Day 400	Nihon Kaikin Ekisai Kai	..	300, 600	PG	..	0800 to 1100	0.40
Kurama ..	JGR	—	Navy ..	..	—	O	..	2000 to 2400	—
Kureha Maru ²	JBH	Day 400	Tatsumi Kisen Kaisha	..	300, 600	PG	..	0800 to 1100	0.40
Liverpool Maru ²	JPL	Day 500	Kawasaki Kisen Kaisha	..	300, 600	PG	..	1400 to 1700	0.40
Luzon Maru ²	JDQ	Day 200	Osaka Shosen Kaisha	..	300, 600	PG	..	2000 to 2400	0.40
Madras Maru ²	JIR	Day 200	Osaka Shosen Kaisha	..	300, 600	PG	..	0800 to 1100	0.40
Malay Maru ²	JEM	Day 400	Osaka Shosen Kaisha	..	300, 600	PG	..	1400 to 1700	0.40
Mandasan Maru ²	JYJ	Day 400	Mitsui Bussan Kaisha	..	300, 600, 1,800	PG	..	2000 to 2400	0.40
Manila Maru ²	JMR	Day 450 Night 1,300	Osaka Shosen Kaisha	..	300, 600, 1,800	PG	..	0800 to 1100	0.40
Manshu ..	JUT	—	Navy ..	..	—	O	..	2000 to 2400	—
Mayachi Maru ²	JEL	Day 200	Hokkaido Tanko Kisen Kaisha	..	300, 600	PG	..	0800 to 1100	0.40
Meichi Maru ²	JBA	Day 200	Meiji Katun Kaisha	..	300, 600	P	..	1400 to 1700	0.40
Meichu Maru ²	JFR	Day 400	Meiji Katun Kaisha	..	300, 600	PG	..	2000 to 2400	0.40
Meidal Maru ²	JFD	Day 300	Yamaji Kisen Kaisha	..	300, 600	PG	..	0800 to 1100	0.40
Meikai Maru ²	JCA	Day 200	Meiji Katun Kaisha	..	300, 600	PG	..	1400 to 1700	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
JAPAN—contd.							Frans.	Frans.	
Meiko Maru *	JDO	Day 400	Meiji Kaiun Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Meiten Maru *	JDG	Day 400	Meiji Kaiun Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Meiu Maru *	JFV	Day 400	Meiji Kaiun Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Mexico Maru *	JMX	Day 350 Night 1,200	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Milkecan Maru *	JBI	Day 200	Mitsui Bussan Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Mikasa ..	JGC	—	Navy	—	O	—	—	—	
Mishima ..	JUL	Day 450 Night 1,200	Nippon Yusen Kaisha	300, 600	P G	—	—	—	
Mishima Maru *	JMQ	Day 400	Navy	—	O	—	—	—	
Mogami ..	JWD	Day 400	Nippon Yusen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Muroran Maru *	JAK	Day 400	Navy	—	O	—	—	—	
Musashi ..	JUY	Day 400	Nippon Yusen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Nagano Maru *	JCI	Day 400	Navy	—	O	—	—	—	
Nagato ..	JGL	Day 400	Nippon Yusen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	—	—	
Nagato Maru *	JBY	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Nankai Maru *	JYF	Day 400	Meiji Kaiun Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Nanking Maru *	JCG	Day 200	Osaka Shosen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Neisei Maru ² ..	JND	Day 400	Harada Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Nitaka Nikko Maru ¹ ..	JLN JNL	— Day 450 Night 1,200	Navy Nippon Yusen Kaisha ..	..	300, 600, 1,800	O P G	..	N	0.40	—
Nippon Maru ¹ ..	JNP	Day 300 Night 1,000	Toyo Kisen Kaisha ..	..	300, 600	P G	..	N	0.40	—
Nisshin .. Ogasawara Maru ² ..	JRK JOG	— Day 300 Night 800	Navy Ministry of Communications ..	..	300, 600	O	—	—	—	—
Okinawa Maru ² ..	JON	Day 350 Night 1,000	Ministry of Communications ..	..	300, 600	—	—	—	—	—
Okinoshima ..	JUK	—	Navy ..	..	—	O	..	—	—	—
Oridono Maru ² ..	JCO	Day 400	Tatsuuma Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Oturu Maru No. 2 ² ..	JEH	Day 400	Yamashita Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Otori Maru ² ..	JOT	Day 300	Roryo Suisan Kumiai ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Oura Maru ² ..	JYC	Day 300	Nippon Kaiji Kogyo Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Panama Maru ¹ ..	JPM	Day 350 Night 1,200	Osaka Shosen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Peking Maru ² ..	JFP	Day 200	Osaka Shosen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Penang Maru ² ..	JDR	Day 200	Nippon Yusen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Persia Maru ² .. Portsaid Maru ² ..	JPP JPN	Day 400 Day 500	Toyo Kisen Kaisha Kawasaki Kisen Kaisha ..	..	300, 600, 1,800 300, 600	P G P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40 0.40	—
Rafuku Maru ² ..	JHL	Day 400	Kawasaki Zosenjo ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Rangoon Maru ² ..	JDY	Day 200	Nippon Yusen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Rashu Maru ¹ .. Riojun Maru ² .. Rozan Maru ² ..	JER JVR JOZ	Day 400 Day 400 Day 200	Imperial Government Railways .. Nanyo Yusen Kaisha .. Hashimoto Kisen Kaisha ..	..	300, 600 300, 600, 1,800 300, 600	P G P G P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40 0.40 0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Mini- mum per Radio- tele- gram.	
JAPAN—contd.									
Sado Maru ¹ ..	JSD	Day 300 Night 1,000	Nippon Yusen Kaisha ..	300, 600	P G ..	N	0.40	—	
Saga JWL	JWL	—	Navy ..	—	O	—	—	—	
Saigon Maru ² ..	JEV	Day 200	Osaka Shosen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Saikai Maru ² ..	JEZ	Day 400	Katsuda Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Sakaki Maru ¹ ..	JKI	Day 400 Night 1,200	S. Manchurian Rly. Co. ..	300, 600	P G ..	N	0.40	—	
Sakigake Maru No. 3 ²	JBK	Day 100	Nippon Kaijo Kogyo Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Sanuki Maru ² ..	JPS	Day 400	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Satsuma IGJ ..	IGJ	—	Navy ..	—	O	—	—	—	
Scotland Maru	JSJ	Day 400	Kawasaki Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Seattle Maru ¹ ..	JST	Day 350 Night 1,200	Osaka Shosen Kaisha ..	300, 600	P G ..	N	0.40	—	
Seitoku Maru ..	JDM	Day 500	Kawasaki Zosenjo ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Seiyo Maru ¹ ..	JSY	Day 400	Toyo Kisen Kaisha ..	300, 600	P G ..	N	0.40	—	
Settsu ..	JGM	—	Navy ..	—	O	—	—	—	
Shidzuoka Maru ¹	JSZ	Day 350 night 1,200	Nippon Yusen Kaisha ..	300, 600	P G ..	N	0.40	—	
Shikishima ..	JGA	—	Navy ..	—	O	—	—	—	
Shinano Maru ¹	JSN	Day 350 Night 1,200	Nippon Yusen Kaisha ..	300, 600	P G ..	N	0.40	—	

Shinbu Maru ¹ ..	JBB	Day 400	Katsuda Kisen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shinkoku Maru ¹	JCV	Day 500	Kishimoto Kisen Kaisha	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shinpo Maru ¹ ..	JDH	Day 400	Kishimoto Kisen Kaisha	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shinsei Maru ¹ ..	JEF	Day 200	Kishimoto Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shinyo Maru JSH ¹	JSH	Day 450 Night 1,500	Toyo Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shinyo Maru JPY ¹	JPY	Day 200	Kishimoto Kisen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shiragi Maru ¹ ..	JSK	Day 350 Night 1,000	Imperial Government Railways ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Shunko Maru ¹ ..	JSQ	Day 400	Goko Shokai ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40 ^a	—
Siam Maru ¹ ..	JYX	Day 200	Osaka Shosen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Siberia Maru ¹ ..	JBR	Day 500 Night 1,500	Toyo Kisen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Singapore Maru ¹	JSP	Day 500	Kawasaki Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Somedono Maru ¹	JYN	Day 400	Tatsuuma Kisen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Suki Maru ¹ ..	JDP	Day 300	Tatsuuma Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Suma ..	JLL	—	Navy ..	..	—	O	..	0800 to 1100 1400 to 1700 2000 to 2400	—	—
Sumatra Maru ¹	JCU	Day 500	Osaka Shosen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Sumida	JWG	—	Navy ..	..	—	O	..	0800 to 1100 1400 to 1700 2000 to 2400	—	—
Suwa Maru ¹ ..	JSU	Day 450 Night 1,200	Nippon Yusen Kaisha ..	..	300, 600, 1,800	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Suwo ..	JUG	—	Navy ..	..	—	O	..	0800 to 1100 1400 to 1700 2000 to 2400	—	—
Tacoma Maru ¹	JTA	Day 350 Night 1,200	Osaka Shosen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Taichu Maru ¹ ..	JTC	Day 300 Night 1,000	Osaka Shosen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—
Taigi Maru ¹ ..	JIF	Day 400	Uchida Kisen Kaisha ..	..	300, 600	P G	..	0800 to 1100 1400 to 1700 2000 to 2400	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-tele-gram.	
JAPAN—contd.							Francs.	Francs.	
Taiho Maru ²	JHV	Day 400	Uchida Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Taikai Maru ²	JEE	Day 400	Taiwan Setto Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tainan Maru ¹	JTN	Day 300 Night 1,000	Osaka Shosen Kaisha	300, 600	P G	N	0.40	—	
Taisan Maru ²	JFW	Day 400	Hashimoto Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Taisei Maru ¹	JTM	Day 300 Night 1,000	Mercantile Marine School	300, 600	P G	N	0.40	—	
Taito Maru ²	JFT	Day 400	Uchida Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Taiyu Maru ²	JCW	Day 400	Uchida Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tajima Maru ²	JPJ	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tama Maru ²	JFI	Day 400	Tokio Kaiun Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tamatsu Maru ²	JTP	Day 400	Yamashita Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tamba Maru ¹	JTB	Day 300 Night 1,000	Nippon Yusen Kaisha	300, 600	P G	N	0.40	—	
Tango Maru ¹	JTG	Day 450 Night 1,200	Nippon Yusen Kaisha	300, 600, 1,800	P G	N	0.40	—	
Tatsuno Maru ²	JPU	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Taisuta Tencho Maru *	JLO JHG	— Day 150	Navy Tatsuma Kisen Kabushiki Kaisha	— 300, 600	O P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tenkai Maru *	JCN	Day 400	Koyanagi Shichishiro	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tenpalsan Maru *	JPZ	Day 400	Mitsui Bussan Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tenryu Tensho Maru *	JLP JCH	— Day 400	Navy Ogura Koichiro	— 300, 600	O P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tenyo Maru *	JTY	Day 450 Night 1,500	Toyo Kisen Kaisha	300, 600	P G	N	0.40
Toba Toba Maru *	JWK JPF	— Day 400	Navy Nippon Yusen Kaisha	— 300, 600, 1,800	O P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tokai Maru *	JDK	Day 400	Nansho Yoko	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tokiwa Tokiwa Maru *	JRB JYW	— Day 400	Navy Nippon Yusen Kaisha	— 300, 600, 1,800	O P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tokushima Maru *	JTQ	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tokuyama Maru	JTU	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tone	JLF	—	Navy	—	O	—	—
Tosa Maru *	JBT	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tosan Maru *	JFZ	Day 400	Katsuta Kisen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tottori Maru *	JPQ	Day 400	Nippon Yusen Kaisha	300, 600	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Toyama Maru *	JTX	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Toyoashi Maru *	JPT	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Toyooka Maru *	JYO	Day 400	Nippon Yusen Kaisha	300, 600, 1,800	P G	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Tsugaru..	JLC	—	Navy	—	O	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
JAPAN—contd.							Francs.	Francs.	
Tsuruga Maru :	JPA	Day 400	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700	0.40	—	
Tsurugisan Maru :	JBL	Day 400	Mitsui Bussan Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700	0.40	—	
Tsurushima Maru :	JTV	Day 400	Uwajima Unyu Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700	0.40	—	
Tsushima	JLO	—	Navy	—	O ..	—	—	—	
Tsushima Maru JMA :	JMA	Day 400	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700	0.40	—	
Tsushima Maru JTL :	JTL	Day 350 Night 1,000	Imperial Government Railways ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Tsuyama Maru :	JYM	Day 400	Nippon Yusen Kaisha ..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Uji ..	JWF	—	Navy	—	O ..	—	—	—	
Ume Maru :	JEW	Day 400	Taiyo Kaiun Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Wakamiya ..	JUR	—	Navy	—	O ..	—	—	—	
Wakasa Maru :	JPW	Day 400	Nippon Yusen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Yahagi ..	ILK	—	Navy	—	O ..	—	—	—	
Yakumo	JRC	—	Navy	—	O ..	—	—	—	
Yakumo Maru :	JYS	Day 400	Osaka Shosen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Yamagata Maru :	JCP	Day 400	Nippon Yusen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	
Yamashiro	JGO	—	Navy	—	O ..	—	—	—	
Yamato ..	JGX	—	Navy	—	O ..	—	—	—	
Yaye Maru :	JAE	Day 400	Kokusan Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40	—	

Yaye Maru ¹ ..	JAE	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yayoi Maru ¹ ..	JYI	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yeboeshi Maru ²	JHO	Day 400	Nippon Yusen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yeitai Maru ² ..	JCT	Day 400	Katsuda Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yerimo Maru ²	JEA	Day 200	Osaka Shosen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yesaki Maru ² ..	JEQ	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yetorofu Maru ²	JFA	Day 200	Nippon Yusen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yodo ..	JWC	—	Navy ..	..	—	O ..	—	—
Yoko Maru ² ..	JAB	Day 400	Taiyo Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yokohama Maru ¹	JVH	Day 350 Night 1,200	Nippon Yusen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400 N	0.40
Yomei Maru ² ..	JIX	Day 400	Taiyo Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yonan Maru ² ..	JNC	Day 400	Taiyo Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yone Maru ² ..	JIW	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yoshida Maru No. 1 ² ..	JIH	Day 200	Yamashita Kisen Kaisha..	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yoshida Maru No. 2 ² ..	JBY	Day 400	Yamashita Kisen Kaisha..	..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yoshida Maru No. 3 ² ..	JCY	Day 400	Yamashita Kisen Kaisha..	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yubae Maru ² ..	JYE	Day 400	Kokusai Kisen Kaisha	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yubari Maru ..	JBU	Day 400	Hokkaido Tanko ..	..	300, 600, 1,800	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40
Yuki Maru ² ..	JDC	Day 300	Tatsuuma Kisen Kaisha ..	..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
JAPAN—contd.									
Yuri Maru *	JAF	Day 400	Teikoku Kisen Kaisha ..	300, 600	P G ..	0800 to 1100 1400 to 1700 2000 to 2400	France. 0.40	—	
MEXICO									
Coahuila *	XBL	—	Comp. de Fomento del Sur. de Mexico	—	P G ..	—	0.40	—	
General Zaragoza	XCA	—	Navy	600	O ..	0200 to 0600 1800 to 2200	—	—	
Jalisco *	XBK	—	Comp. de Fomento del Sur. de Mexico	—	P G ..	—	0.40	—	
Korrigan III *	XBF	200	Cia del Boleo ..	300, 600	P G ..	X	0.40	—	
Mazatlan *	XBH	200	Lloyd Mexicano ..	300, 600	P G ..	X	0.40	—	
Mexico XBB	XBH	120	Comp. Mexicana de Nav. ..	300, 600	P G ..	X	0.40	—	
Progreso	XCF	400	Government	600	P G ..	N	0.40	4.00	
San Antonio *	XBE	130	Cia. Mexicana de Vap. "San Antonio"	300, 600	P G ..	X	0.40	—	
San Bernardo *	XBA	170	Cia. Mexicana de Petroleo "El Agula."	300, 600	P G ..	X	0.40	—	
San Cristobal *	XBI	—	Cia. Mexicana de Petroleo "El Agula."	—	P G ..	—	0.40	—	
MONACO									
Hirondelle	CQA	380	Prince of Monaco	600	P ..	X	—	—	
MOROCCO									
Faci	CNJ	120	Customs Administration	300	O ..	N	—	—	
Marrakchi	CNM	120	Customs Administration	300	O ..	N	—	—	
Meknessi	CNK	120	Customs Administration	300	O ..	N	—	—	
Taradant	CNT	120	Customs Administration	300	O ..	N	—	—	
NATAL									
Assouan	—	—	Assouan S.S. Co., Ltd. ..	—	—	—	—	—	

* Operated and controlled by the Marconi International Marine Com. Co., Ltd., London

* Operated and controlled by the Radio Corp. of America

NETHERLANDS
(See HOLLAND)

NEW FOUNDLAND

[illegible]

NEW ZEALAND

	VMA	Day 150 Night	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	0.20 ^a	
Arahura ¹	..	400	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	0.40	
Atua ¹	..	325	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	0.40	
Flora ¹	..	—	Union S.S. Co. of N.Z., Ltd.	—	—	—	—	
Kaipoi ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Kaitangata ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Kaituna ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Kaiwaro ¹	..	—	Union S.S. Co. of N.Z., Ltd.	—	—	—	—	
Kanna	200	Government	300, 600	O	0130 to 0230 0630 to 2330	0.20	
Karon ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Katoka ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Kauri ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Keromiko ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Kurow ¹	..	—	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	—	
Maheno ¹	..	325	Union S.S. Co. of N.Z., Ltd.	300, 600	P G	X	0.40	

Ship Stations—Continued

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
NEW ZEALAND—contd.									
Makura ¹	VLK	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	Francs. 0.20 ³	—	
Manuka ¹	VLN	325	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Maori ¹	VLZ	Day 250 Night 500	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.10 ⁴	0.60 ⁴	
Marama ¹	VLR	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.40	—	
Mararoa ¹	VMZ	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Maunganui ¹	VLO	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Moana ¹	VLM	325	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Moeraki ¹	VLM	325	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.40	—	
Mokola ¹	VLM	Day 250 Night 500	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Monowai ¹	VMM	150	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Navua ¹	VLV	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Niagara ¹	GBE	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.40	—	
Onah ¹	VXA	—	Union S.S. Co. of N.Z., Ltd.	—	PG	X	—	—	
Paloona ¹	VLY	Day 250 Night 500	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20 ³	—	
Pateena ¹	VZD	500	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Rakanoa ¹	VME	—	Union S.S. Co. of N.Z., Ltd.	—	PG	X	—	—	
Rotomahana ¹	VMX	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Tahiti ¹	MYN	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Talune ¹	VLL	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20	—	
Tarawera ¹	VMF	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.40	—	
Terawhiti ¹	VMH	Day 60 Night 125	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.20	—	
Tofua ¹	VLK	250	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.40	—	
Tutanekai ¹	VLX	325	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	0.10 ⁴	0.60 ⁴	
Whane ¹	VLJ	Day 250 Night 500	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Waihora ¹	VMW	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Wainarino ¹	VUS	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	
Waipori ¹	VMO	—	Union S.S. Co. of N.Z., Ltd.	300, 600	PG	X	—	—	

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
NORWAY—contd.									
Frøya ..	LBD	—	Navy ..	—	O ..	—	Francs. —	—	
Garm ..	LBC	—	Navy ..	—	O ..	—	—	—	
George Washington *	LFQ	150-200	A/S "Borga" (P. Olsen) ..	300, 600	O ..	X	0.40	4.00	
Glommen ..	LEB	—	Navy ..	—	O ..	—	—	—	
Golaa *	LGM	100-150	F. Siegarth ..	300, 600	P G ..	X	0.40	4.00	
Golden Gate *	LGR	435	Knut Knutsen ..	300, 600	P G ..	X	0.40	4.00	
Governor Forbes *	LHA	300	A. O. Lindvig ..	300, 600	P G ..	N	0.20	2.00	
Graziella *	LWK	150-200	Fearnley & Eger ..	300, 600	P G ..	X	0.40	4.00	
Grena *	LHH	100-150	J. L. Mowinkel ..	300, 600	P G ..	X	0.40	4.00	
Grib ..	LBI	—	Navy ..	—	O ..	—	—	—	
Haakon VII *	LDL	160	Det. Nordenfjeldske Dampskib.	300, 450, 600	P G ..	0100 to 0300 0700 to 0900 1300 to 1500 1900 to 2100	0.20	2.00	
Hallfrid *	LFT	600	P. Kleppe ..	300, 600	P G ..	X	0.40	4.00	
Hamlet *	LGD	160	Bruusgaard, Kiøsturd & Co., Drammen	300, 600	P G ..	X	0.20	2.00	
Hanna Nielsen *	LGI	200-250	B. Stolt Nielsen, Haugesund	300, 600	P G ..	X	0.40	4.00	
Harald Haarfrage ..	LAB	—	Navy ..	—	O ..	—	—	—	
Havø *	LDC	600	Henrik Østervold ..	300, 600	P G ..	X	0.40	4.00	
Heindal ..	LAZ	—	Navy ..	—	O ..	—	—	—	
Hercules LCV *	LGY	100-150	Norway-Mexico Gulf Line	300, 600	P G ..	X	0.40	4.00	
Honnedal *	LWI	150-200	Fearnley & Eger ..	300, 600	P G ..	X	0.40	4.00	
Hovland *	LWL	400	Alf Lunde ..	300, 450, 600	P G ..	X	0.40	4.00	
Hval ..	LAN	—	Navy ..	—	O ..	—	—	—	
Ingsborg Bakkevig *	LWM	150	T. Bakkevig & Søn A/S ..	300, 450, 600	P G ..	X	0.40	4.00	
Iris LFH *	LFH	120	Det Bergenske Dampskibsselskab	300, 450, 600	P G ..	X	0.20	2.00	
Irma *	LDQ	240	Det Bergenske Dampskibsselskab	300, 450, 600	P G ..	X	0.20	2.00	
Jason LEL *	LEL	110	A/S Norsk Bjergringsskipskompani	300, 600	P G ..	X	—	—	
Jessie ..	LWA	400	Louis Wetlesen ..	300, 450, 600	P G ..	X	0.40	4.00	
Jo ..	LAQ	—	Navy ..	—	O ..	—	—	—	
Jupiter LEB *	LEB	135	Det Bergenske Dampskibsselskab	300, 450, 600	P G ..	0230 to 0300 0830 to 0900 1430 to 1500 2030 to 2100	0.20	2.00	
Kalfaril *	LGF	200-250	D. Steen, Kristiania	300, 600	P G ..	X	0.40	4.00	
Kry West *	LQG	435	Knut Knutsen ..	300, 600	P G ..	X	0.40	4.00	
Kjeil ..	LAT	—	Navy ..	—	O ..	—	—	—	

Knut Hamsun. Kong Harald	LWB LDK	300 160	Olaf Ørvig Det Nordenfjeldske Dampskibs- selskab	300, 450, 600 300, 600	P G	0100 to 0300 0700 to 0900 1300 to 1500 1900 to 2100	0.20	2.00
Landaa ¹	LHE	435	B. Stolt Nielsen	300, 600	P	X	0.40	4.00
Landvard ¹	LGC	200-250	Government	300, 600	P	X	0.40	4.00
Laugen ¹	LBH	—	Navy	—	O	—	—	—
Lidvard ¹	LGB	200-250	Government	300, 600	P	X	0.40	4.00
Lom ¹	LAP	—	Navy	—	O	—	—	—
Louise Nielsen ¹	LGI	200-250	B. Stolt Nielsen, Haugesund	300, 600	P	X	0.40	4.00
Lyngsfjord ¹	LFM	100-150	Den Norske Amerika-Line	300, 600	P	X	0.40	4.00
Marcopa ¹	LEE	100-150	Akties-Tankfart	300, 600	P	X	0.40	4.00
Mesa ¹	LEV	—	Den Norske Afrika & Austral.	—	—	—	—	—
Mexicano LDH ¹	LDH	270-320	Norway-Mexico Gulf Line	300, 600	P	—	0.40	4.00
Mira ¹	LFJ	120	Det Bergenske Dampskibsselskab	300, 450, 600	P	X	0.20	2.00
Morgana ¹	LHZ	400	Jespersen	300, 450, 600	P	X	0.40	4.00
Nevis ¹	LHN	—	Olaf Ørvig	—	—	—	—	—
Nidaros ¹	LEK	110	A/S. Norsk Bjergringskompani	300, 600	P	X	0.40	4.00
Niels Nielsen ¹	LGH	200-250	B. Stolt Nielsen, Haugesund	300, 600	P	X	0.40	4.00
Norge ¹	LAC	—	Navy	—	O	—	—	—
Noruega ¹	LDG	180	Norway-Mexico Gulf Line	300, 600	P	X	0.40	4.00
Ørn II ¹	LDO	160-270	A/S. Ørnen, Sandefjord	300, 450, 600	P	X	0.40	4.00
Ørn II LWQ ¹	LWQ	600	A/S Tonsberg Hvalangeri	300, 450, 600	P	X	0.40	4.00
Preston LDW ¹	LDW	400	O. & A. Irgens	300, 600	P	X	0.40	4.00
Ravn ¹	LBG	—	Navy	—	O	—	—	—
Ragnvald Jarl ¹	LDJ	160	Det Nordenfjeldske Dampskib.	300, 450, 600	P	—	0.20	2.00
Ranenfjord ¹	LGS	200-250	Den Norske Amerika-Line	300, 600	P	X	0.40	4.00
Regulus ¹	LHD	300	A. O. Lindvig	300, 600	P	X	0.20	2.00
Rena ¹	LFD	150-250	Den Norske Afrika- og Aust.	300, 600	P	X	0.40	4.00
Rio de Janeiro LDM ¹	LDM	150-250	Det Nordenfjeldske Dampskib.	300, 600	P	X	0.40	4.00
Rio de la Plata LDN ¹	LDN	150-250	Det Nordenfjeldske Dampskib.	300, 600	P	X	0.40	4.00
Rodskjær ¹	LEP	—	Jacobsen & Co., Langesund	—	—	—	—	—
Ronsdalsfjord ¹	LEJ	100-150	Den Norske-Amerika Linje	300, 600	P	X	0.40	4.00
Røvær ¹	LHG	100-150	J. K. Haaland	300, 600	P	X	0.40	4.00
Sæl ¹	LAL	—	Navy	—	O	—	—	—
Sagaland ¹	LGP	100-150	R. Amlie	300, 600	P	X	0.40	4.00
Salvage ¹	LFY	150-200	A/S. Norsk Bjergringskompani	300, 600	P	X	0.40	4.00
Salvator ¹	LEM	150-250	A/S. Norsk Bjergringskompani	300, 600	P	X	—	—
Sarpen ¹	LBE	—	Navy	—	O	—	—	—
Sild ¹	LBF	—	Navy	—	O	—	—	—
Simla ¹	LEW	—	Den Norske Afrika- & Aust.	—	—	—	—	—
Sinaloa ¹	LHB	300	A. O. Lindvig	300, 600	P	X	0.20	2.00
Sirrah LWR ¹	LWR	400	H. A. Christensen	300, 450, 600	P	X	0.40	4.00
Sjøa ¹	LX	—	Den Norske Afrika- & Aust.	—	—	—	—	—
Skarv ¹	LAR	—	Navy	—	O	—	—	—
Skrei ¹	LAM	—	Navy	—	O	—	—	—
Teist ¹	LAS	—	Navy	—	O	—	—	—
Tordenskjold ¹	LAD	—	Navy	—	O	—	—	—
Trods ¹	LAO	—	Navy	—	O	—	—	—
Troll ¹	LAI	—	Navy	—	O	—	—	—
Valkryen ¹	LAK	—	Navy	—	O	—	—	—
Ørn ¹	LBJ	—	Navy	—	O	—	—	—

	CSB	160	Empreza Nacional de Nav.	300, 450, 600	P G	N	0.40	4.00
Beira CSB ¹	..	160	Empreza Nacional de Nav.	300, 450, 600	P G	..	..	..
Beira CTK	..	—	Navy	—	O	..	..	..
Berio	..	80	Navy	400	O	..	..	..
Bolama ¹	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Cabo Verde	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Cazengo	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Chaimite	..	—	Navy	—	O	X	..	..
Cinco D'Outubro	..	100-150	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Coimbra ¹	..	100-150	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Congo ¹	..	100-150	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Cunene ¹	..	—	Furness, Withy & Co., Ltd.	—	—	..	..	..
Dondo ¹	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Douro CTG	..	—	Navy	—	O	..	..	..
Espadarte	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Extremadura CSJ ¹	..	100-150	Furness, Withy & Co., Ltd.	—	—	..	..	..
Faro ¹	..	—	Furness, Withy & Co., Ltd.	—	—	..	..	..
Fernao Veloso ¹	..	—	Furness, Withy & Co., Ltd.	—	—	..	..	..
Figuera ¹	..	—	Furness, Withy & Co., Ltd.	—	—	..	..	..
Funchal ¹	..	100-150	Empreza Insulana de Nav. (Lisbon)	300, 600	P G	X	0.40	4.00
Gaza ¹	..	100-150	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Gala ¹	..	—	Furness, Withy & Co., Ltd.	—	—	..	..	..
Gil Eannes ¹	..	150	Navy	600	O	X	..	..
Goa ¹	..	100	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Granja ¹	..	100-150	Comissao Dos Transportes Mar.	300, 600	P G	X	0.40	4.00
Guine	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00
Guardiana CTH	..	—	Navy	—	O	..	..	..
Ibo	..	Day 150	Comissao Dos Transportes Mar.	300, 450, 600	P G	N	0.40	4.00
India ¹	..	Night	Comissao Dos Transportes Mar.	300, 450, 600	P G	..	..	..
Insulano	..	250	Parceria Geral de Pescarias	300, 600	P G	X	0.40	4.00
Kionga	..	150-200	Navy	600	O	X	..	..
Lagos ¹	..	20	Comissao Dos Transportes Mar.	300, 600	P G	N	0.40	4.00
Lima CSN ¹	..	100-150	Empreza Nacional de Nav.	300, 450, 600	P G	N	0.40	4.00
Loanda ¹	..	100-150	Empreza Nacional de Nav.	300, 600	P G	X	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram	
PORTUGAL—contd.									
Lourenço Marques ¹	CRJ	100-150	Commissao dos Transportes Mar. (Lisbon)	300, 450, 800	P G ..	N	Francs. 0.40	Francs. 4.00	
Malo ¹ CRK	CRK	100-150	Commissao dos Transportes Mar. (Lisbon)	300, 450, 800	P G ..	N	0.40	4.00	
Minho ¹	CUM	100-150	Commissao dos Transportes Mar. (Lisbon)	300, 800	P G ..	X	0.40	4.00	
Mocambique ¹	CSM	160	Empresa Nacional de Nav. (Lisbon)	300, 450, 800	P G ..	N	0.40	4.00	
Mormugao ¹	CUH	325	Commissao dos Transportes Mar. (Lisbon)	300, 800	P G ..	N	0.40	4.00	
Mossamedes ¹	CSE	160-250	Empresa Nacional de Nav. (Lisbon)	300, 450, 800	P G ..	N	0.40	4.00	
Pangim ¹	CSW	—	Furness, Withy & Co., Ltd. (London)	—	—	—	—	—	
Patia CTZ	CTZ	—	Navy	—	O	—	—	—	
Pedro Nunes	CTP	300	Furness, Withy & Co., Ltd. (London)	600	O	—	—	—	
Peniche ¹	CSX	100-150	Furness, Withy & Co., Ltd. (London)	300, 800	P G ..	X	0.40	4.00	
Peninsular ¹	CSR	100-200	Empresa Nacional de Nav. (Lisbon)	300, 450, 800	P G ..	X	0.40	4.00	
Porto ¹	CRR	150-200	Sale & Co., London	300, 800	P G ..	X	0.40	4.00	
Porto Alexandre ¹	CRM	100-150	Commissao dos Transportes Mar. (Lisbon)	300, 800	P G ..	N	0.40	4.00	
Portugal ¹	CSP	160	Empresa Nacional de Nav. (Lisbon)	300, 450, 800	P G ..	N	0.40	4.00	
Quelimane ¹	CUQ	100-150	Commissao dos Transportes Mar. (Lisbon)	300, 800	P G ..	N	0.40	4.00	
Republica CTE	CTE	—	Navy	—	O	—	—	—	
Republica CTN	CTN	40	Furness, Withy & Co., Ltd. (London)	600	O	—	—	—	
Sacaven ¹	CRW	—	Furness, Withy & Co., Ltd. (London)	—	—	—	—	—	
Sado ¹	CSC	—	Commissao dos Transportes Mar. (Lisbon)	—	—	—	—	—	
San Gabriel	CTD	150	Navy	—	O	—	—	—	
San Jorge ¹	CUS	150-200	Commissao dos Transportes Mar. (Lisbon)	300, 450, 800	P G ..	N	0.40	4.00	
San Miguel ¹	CSS	100-150	Empresa Insulana de Nav. (Lisbon)	300, 800	P G ..	X	0.40	4.00	
Sines ¹	CRL	—	Furness, Withy & Co., Ltd. (London)	300, 800	P G ..	—	—	—	
Telo	CTI	—	Furness, Withy & Co., Ltd. (London)	300, 450, 800	P G ..	—	—	—	

Tras-os-Montes ¹	CST	—	Furness, Withy & Co., Ltd. (Lond)	—	—	N	—	—	—
Vasco da Gama	CTB	150	Navy	—	—	N	0.40	4.00	—
Viana ¹	CUO	100-150	Commissao dos Transportes Mar. (Lisbon)	—	—	N	—	—	—
Vulcano	CTM	—	Navy	—	—	X	—	—	—
Zaire ¹	CSZ	100-150	Empresa Nacional de Nav. (Lisbon)	—	—	X	0.40	4.00	—
ROMANIA									
Imperatul Traian ¹	CVD	240	Government Marine Department	—	—	N	0.30	3.00	¹ Operated and controlled by the owners
Principesa Maria ¹	CVF	240	Government Marine Department	—	—	N	0.30	3.00	² Public correspondence is with Constanza Tunnel only
Regele Carol I. ¹	CVC	240	Government Marine Department	—	—	N	0.30	3.00	—
Romania ¹	CVR	240	Government Marine Department	—	—	N	0.30	3.00	—
RUSSIA									
Admiral Makharoff	RCK	—	Admins. of Province of Kamchatka	—	—	O	—	—	¹ Operated by the owner
Admiral Zavoiko ¹	RNZ	125	—	—	—	P G	0.40	—	² Provisionally
Afon ¹	RPA	450	Cie Russe de Nav. à Vap. et de Commn.	—	—	P G	0.40 ⁵	—	³ Also in emergency at any time of day or night
Aleksandria	RFI	—	Navy	—	—	O	—	—	⁴ Station is open during first and last fifteen minutes of each hour from 0800 to 2200
Almaz	RKU	—	Navy	—	—	O	—	—	⁵ Ship charge is reduced to 13 centimes per word for correspondence with Russian coast and ship stations
Amour	RGP	—	Navy	—	—	O	—	—	—
Anadyr	RJS	—	Navy	—	—	O	—	—	—
Andrei Pervozvannyi	RCB	—	Navy	—	—	O	—	—	—
Angara	RIB	—	Navy	—	—	O	—	—	—
Askold	RMA	—	Navy	—	—	O	—	—	—
Astrakhan	RON	Day 100 Night 250	Volunteer Fleet	—	—	P G	0.40 ⁵	—	—
Avrora	RCO	—	Navy	—	—	O	—	—	—
Baian	RGJ	—	Navy	—	—	O	—	—	—
Berezan	RKZ	—	Navy	—	—	O	—	—	—
Bobr	RGW	—	Navy	—	—	O	—	—	—
Bogatyr	RGM	—	Navy	—	—	O	—	—	—
Cherson ¹	RNJ	250	Volunteer Fleet	—	—	P G	0.40 ⁵	—	—
DOBROVOLETS									
Dobrovolets	RHO	—	Navy	—	—	O	—	—	—
Donetz	RKO	—	Navy	—	—	O	—	—	—
Donskoi Kazak	RHW	—	Navy	—	—	O	—	—	—
Donnail	RKW	—	Navy	—	—	O	—	—	—
Eclips	REE	430	Department of Marine	—	—	P	0.40 ⁵	—	—
Ekatérinoslav	RNH	250	Volunteer Fleet	—	—	P G	0.40 ⁵	—	—
EMIR BOUKHARSKII									
Emir Boukhariskii	RHK	—	Navy	—	—	O	—	—	—
Ennissey	RGQ	—	Navy	—	—	O	—	—	—
Eriva ¹	RNQ	350	Volunteer Fleet	—	—	P G	0.40 ⁵	—	—
FUPHRATE									
Fuphrate	RPD	450	Cie Russe de Nav. à Vap. et de Commn.	—	—	P G	0.40 ⁵	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
RUSSIA—contd.						Time of Petrograd	Francs.	Francs.	
Evstafii	RKA	—	Navy	—	O	—	—	—	
Finn	RHL	—	Navy	—	O	—	—	—	
Gaidamak	RHQ	—	Navy	—	O	—	—	—	
General Kondratienko	RHC	—	Navy	—	O	—	—	—	
Gheorgii Pobedonosetz	RKI	—	Navy	—	O	—	—	—	
Gromoboi	RGJ	—	Navy	—	O	—	—	—	
Guliak	RGZ	—	Navy	—	O	—	—	—	
Herta	RHE	430	Department of Marine	300, 600, 900	P	X	0.40 ^s	—	
Iaroslavl	RNO	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400 0200 to 0400 1200 to 1400 1800 to 2000	0.40 ^s	—	
Imperator Alexandre III ¹	RPU	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Imperator Nicolai ¹	RPM	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Imperator Nicolai II ¹	RPB	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Imperator Pavel I	RGC	—	Navy	—	O	—	—	—	
Imperator Piotre Vélki ¹	RPP	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Imperatriza Ekaterina II ¹	RPS	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Ioann Zlatoust	RKC	—	Navy	—	O	—	—	—	
Irtych ¹	ROJ	60	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400 0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s	—	
Jérusalem ¹	RPI	450	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G	0200 to 0400 0800 to 1000 1200 to 1400 1800 to 2000	0.40 ^s	—	
Kagoul	RKM	—	Navy	—	O	—	—	—	
Kama	RID	—	Navy	—	O	—	—	—	
Kamennetz-Podolsk	ROP	170	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600	0.40 ^s	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
RUSSIA—contd.						Time of Petrograd	Francs.	Francs.	
Onsk ¹	ROM	170	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Oukraina	RHT	—	Navy	—	O	—	—	—	
Ouraletz	RKP	—	Navy	—	O	—	—	—	
Oussouriets	RHR	—	Navy	—	O	—	—	—	
Oussourri	RMD	—	Navy	—	O	—	—	—	
Pallada	RGS	—	Navy	—	O	—	—	—	
Pamiat Merkaouria	RKL	—	Navy	—	O	—	—	—	
Panteleimon	RKD	—	Navy	—	O	—	—	—	
Pechora	RIE	—	Navy	—	O	—	—	—	
Penza ¹ ..	RSZ	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Piotre Vélki ¹	RPR	110	Committee of Riga Stock Exch...	300, 600	P G	—	0.40	—	
Pogranitchnik	RHI	—	Navy	—	O	—	—	—	
Polezny ¹	RPZ	100	Cie Russe de Nav. à Vap et de Comm.	300, 600	P G	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s	—	
Poliarnaya Zvezda	RFD	—	Navy	—	O	—	—	—	
Poltava ¹ ..	RST	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Prinzessa Evguénia	RPH	300	Cie Russe de Nav. à Vap. et de Comm.	300, 600	P G	0200 to 0400 1200 to 1400 1800 to 2000	0.40 ^s	—	
Oldenbourgkaia ¹	RKV	—	Navy	—	O	—	—	—	
Prout ..	RIG	—	Navy	—	O	—	—	—	
Riga	RIG	—	Navy	—	O	—	—	—	
Rossia RGL	RGL	—	Navy	—	O	—	—	—	
Rossia RSR ¹	RSR	200	Cie Russe de Nav. à Vap. de l'Asie Orientale	300, 600	P G	N	0.40 ^s	—	
Rostislav	RKF	—	Navy	—	O	—	—	—	
Rurik	RGA	—	Navy	—	O	—	—	—	
Sibirskii strelok	RHB	—	Navy	—	O	—	—	—	
Sichan ¹ ..	ROB	Day 100 Night 200	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Simbirsk ¹	ROC	Day 100 Night 250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	

Ship	RSP	250	Volunteer Fleet	300, 600, 900	P G	0800 to 1000 300 to 1600 2000 to 2400	0.40 ^s
Simteropo ¹		
Sinop	..	—	Navy	—	O		—
Sivouch	..	—	Navy	—	O		—
Slava	..	—	Navy	—	O		—
Soukhona	..	—	Navy	—	O		—
Soutchan ¹	..	60	Volunteer Fleet	300, 450, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Ssarotov ¹	..	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Standart	..	—	Navy	—	O		—
Stavropol ¹	..	100	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Steregouchii	..	—	Navy	—	O		—
Strachnyl	..	—	Navy	—	O		—
Strela	..	—	Navy	—	O		—
Sviatoi Nicolai ¹	..	300	Cie Russe de Nav. à Vap. et de Comm.	300 600	P G	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s
Taimir	..	—	Navy	—	O		—
Tambov RNW ¹	..	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Tchikhatcheff ¹	..	450	Cie Russe de Nav. à Vap. et de Comm.	300, 600	P G	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s
Teretz	..	—	Navy	—	O		—
Tigre ¹	..	450	Cie Russe de Nav. à Vap. et de Comm.	300, 600	P G	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s
Tobol ¹	..	430	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Tobolsk ¹	..	Day 100 Night 250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Tomsk ¹	..	Day 100 Night 250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Toula ¹	..	250	Volunteer Fleet	300, 600	P G	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s
Tourkmen Stavropolskii	..	—	Navy	—	O		—
Tri Sviatella	..	—	Navy	—	O		—
Tsar ¹	..	100	Cie Russe de Nav. à Vap. de l'Asie Orientale	300, 600	P G	N	0.40 ^s
Tsar Mikhail Féodorovitch ¹	..	450	Cie Russe de Nav. à Vap. et de Comm.	300, 600	P G	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s
Tsarsarevitch	..	—	Navy	—	O		—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
RUSSIA—contd.									
Tsésarevitch Nikolaievitch ¹	RPY	300	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G ..	Petrograd 0200 to 0400 1200 to 1400 1800 to 2000	Francs. 0.40 ^s	—	
Tsésarévitch Gueorgui ¹	RPF	300	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G ..	0200 to 0400 ^s 1200 to 1400 1800 to 2000	0.40 ^s	—	
Turgat ¹	ROH	170	Volunteer Fleet	300, 600	P G ..	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Tver ¹	RNT	210	Volunteer Fleet	300, 600	P G ..	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Voigvatch Véliska - Kniaguinia- Xénia ¹	RML RPG	— 300	Navy Cie Russe de Nav. à Vap. et de Commun.	— 300, 600	O P G ..	— 0200 to 0400 ^s 1200 to 1400 1800 to 2000	— 0.40 ^s	—	
Velikaia Kniaguinia Xénia Alexandrovna Véliskaia Kniaina Maria Nikolaievna	ROD RNI	300 200	Commercial Nav. School, Odessa Volunteer Fleet Training Ship ..	300, 600 600	P G .. P ..	1400 to 1500 2000 to 2100 0800 to 1000 1300 to 1600 2000 to 2400	— 0.40 ^s	—	
Véliski - Kniaz Alex- andre ¹	RPW	300	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G ..	0200 to 0400 1200 to 1400 1800 to 2000	0.40 ^s	—	
Véliski-Kniaz Alexii ¹ ..	RPQ	300	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G ..	0200 to 0400 1200 to 1400 1800 to 2000	0.40 ^s	—	
Véliski Kniaz Con- stantine ¹	RPO	300	Cie Russe de Nav. à Vap. et de Commun.	300, 600	P G ..	0200 to 0400 1200 to 1400 1800 to 2000	0.40 ^s	—	
Vladimir ¹	RNV	250	Volunteer Fleet	300, 600	P G ..	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	
Voiskovoi Vologda RND ¹	RIA RND	— 170	Navy Volunteer Fleet	— 300, 600	O P G ..	— 0800 to 1000 1300 to 1600 2000 to 2400	— 0.40 ^s	—	
Voronéje ¹	RNX	250	Volunteer Fleet	300, 600	P G ..	0800 to 1000 1300 to 1600 2000 to 2400	0.40 ^s	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
SPAIN—contd.									
Armura.	HMU	150	Cia Nav. Vascongada	600	P G	N	Francs.	Francs.	
Arnabal Mendí.	HMI	100	Cia Naviera Sota y Aznar	300, 600	P G	N	0.30	3.00	
Arno Mendí.	TIE	200	Cia Naviera Sota y Aznar	300, 600	P G	N	0.30	3.00	
Arnaiz.	HNC	250	Cia de Tabacos de Filipinas	300, 600	P G	N	0.30	3.00	
Arraiz.	TIF	500	Cia Nav. Vascongada	300, 600	P G	N	0.30	3.00	
Artigué.	ECG	150	Soc. Minera de Villadriid	300, 600	P G	N	0.30	3.00	
Artigan Mendí.	CGU	200	Cia Nav. Sota y Aznar	300, 600	P G	N	0.30	3.00	
Astondo Mendí.	HMK	100	Cia Nav. Sota y Aznar	300, 600	P G	N	0.30	3.00	
Atlante EFA.	EFA	150	Cia Trasméditerranée	300, 600	P G	N	0.30	3.00	
Aviles.	HNO	150	Navy	300, 600	P G	N	0.30	3.00	
Audaz.	EHQ	—	Cia Trasméditerranée	—	O	N	—	—	
Aurias March.	EEA	150	Cia de Nav. Bengolea	300, 600	P G	N	0.30	3.00	
Azapitia.	HNI	150	Cia Nav. Bachi	300, 600	P G	N	0.30	3.00	
Bachi.	TIG	200	Cia Islaña Mar.	300, 600	P G	N	0.30	3.00	
Balear.	EFR	100	Pinillos Izquierdo y Cia	300, 600	P G	N	0.30	3.00	
Balmes.	ECA	275	Garrigos e Hijos	300, 600	P G	N	0.30	3.00	
Banana.	THI	100	Cia Nav. Vascongada	300, 600	P G	N	0.30	3.00	
Barandis.	THI	500	Cia Nav. Baracalda	300, 600	P G	N	0.30	3.00	
Bara-bi.	THI	150	Cia Nav. Baracalda	300, 600	P G	N	0.30	3.00	
Baracaldo.	THK	100	Cia Trasméditerranée	300, 600	P G	N	0.30	3.00	
Barcelo.	EBB	180	Pinillos Izquierdo y Cia	300, 600	P G	N	0.30	3.00	
Barcelona.	ECB	300	Cia Navier Bachi	300, 600	P G	N	0.30	3.00	
Barolo.	CMT	150	Zalvide y Zulaica	300, 600	P G	N	0.30	3.00	
Basconia.	HLB	100	Luis Ibran	300, 600	P G	N	0.30	3.00	
Begonia No. 1.	HLN	150	José Maria Urquijo	300, 600	P G	N	0.30	3.00	
Begonia No. 2.	HLQ	150	José Maria Urquijo	300, 600	P G	N	0.30	3.00	
Begonia No. 3.	HLX	200	José Maria Urquijo	300, 600	P G	N	0.30	3.00	
Begonia No. 4.	CMV	150	José Maria Urquijo	300, 600	P G	N	0.30	3.00	
Begonia No. 5.	HNE	150	José Maria Urquijo	300, 600	P G	N	0.30	3.00	
Begonia No. 6.	HLV	100	Cia Islaña Maritima	300, 600	P G	N	0.30	3.00	
Belver.	THB	200	Cia Nov. Bermes	300, 600	P G	N	0.30	3.00	
Bermeo.	THC	100	Garrigos e Hijos	300, 600	P G	N	0.30	3.00	
Bilbaino.	HMC	100	Cia Espag. de Navegacion	300, 600	P G	N	0.30	3.00	
Bittis.	THM	100	Cia Naviera Sota y Aznar	300, 600	P G	N	0.30	3.00	
Biskargi Mendí.	HMN	100	José Maria Caballero	300, 600	P G	N	0.30	3.00	
Blas de Lezo.	TIN	150	Navy	300, 600	P G	N	0.30	3.00	
Bontar Altes EDB.	EBR	220	Cia Trasméditerranée	300, 600	P G	N	0.30	3.00	
Bustamante.	EBB	260	Cia Trasméditerranée	300, 600	P G	N	0.30	3.00	
Caballero.	PRC	140	Cia Trasméditerranée	300, 600	P G	N	0.30	3.00	
Cabo Curvedra.	CXS	150	Huarra y Compania	300, 600	P G	N	0.30	3.00	

Cabo Carvoeira ²	CXS	150	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Cervera ²	ECU	250	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Creus ²	TIO	500	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Espartal ²	HLU	150	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Menor ²	CXM	150	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Ortigal ²	HXA	150	Ibarra y Cia	300, 600	P, G	N	0.30	3.00
Cabo Socrati ¹	HNN	150	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Tres Forcas ²	HCK	150	Ibarra y Compania	300, 600	P, G	N	0.30	3.00
Cabo Villano ²	HLI	150	Ibarra y Cia	300, 600	P, G	N	0.30	3.00
Cadaro ²	EB?	14	Navy	—	O	N	—	3.00
Cadiz ²	ECC	300	Pinillos Izquiero y Cia	300, 600	P, G	N	0.30	3.00
Camproa ²	CXC	100	Figueroa y Campos	300, 600	P, G	N	0.30	3.00
Canalejas ¹	EEK	100	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Capita Revuelta ²	HNQ	150	Hijos de J. Taya	300, 600	P, G	N	0.30	3.00
Capitan Segarra ²	HMG	250	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Carlos V	EBE	500	Navy	—	O	N	—	3.00
Carolina E. De Per ²⁵	ECF	150	Don Angel F. Perez	300, 600	P, G	N	0.30	3.00
Castilla ¹	EEQ	150	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Castro Alen ²	TIP	150	Cia Iberica de Tel.	300, 600	P, G	N	0.30	3.00
Catalina ²	ECT	300	Pinillos Izquiero y Cia	300, 600	P, G	N	0.30	3.00
Cataluna EDC ²	EDC	108	Cia Transatlantica	300, 600	P, G	N	0.30	3.00
Cataluna EEU ²	EEU	150	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Cataluna EBF	EEB	216	Navy	—	O	N	—	3.00
Cataluna EFC ²	EFC	100	Cia Isla Mar	300, 600	P, G	N	0.30	3.00
Cervera ²	TIQ	100	Soc. Anon. Nav. Espana	300, 600	P, G	N	0.30	3.00
Cervana ²	TIR	150	Hijos de J. Taya	300, 600	P, G	N	0.30	3.00
Cirilo Amores ²	HLR	150	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Ciudad de Cadiz ²	EDZ	108	Cia Transatlantica	300, 600	P, G	N	0.30	3.00
Claudio ²	CMK	100	Cia Naviera Euzkera	300, 600	P, G	N	0.30	3.00
C. Lopez y Lopez	EDH	269	Cia Transatlantica	300, 600	P, G	N	0.30	3.00
Concha ²	HMA	100	Ricardo Ortiz Artinano	300, 600	P, G	N	0.30	3.00
Conde de Abasolo ²	TIS	200	Cia Naviera Vascongada	300, 600	P, G	N	0.30	3.00
Conde de Zubiria ²	CMZ	150	Altos Ornos de Vizaya	300, 600	P, G	N	0.30	3.00
Conde Wifredo ²	ECW	300	Pinillos Izquiero y Cia	300, 600	P, G	N	0.30	3.00
Condor HNM ²	HNH	109	Alejandro Navajas	300, 600	P, G	N	0.30	3.00
Cosme y Jacinta ²	TTT	500	Echevarreta Larinaga	300, 600	P, G	N	0.30	3.00
Cresalubi ²	HTT	100	Cia de Nav. Bengolea	300, 600	P, G	N	0.30	3.00
Cristina Rueda ²	HMD	100	Garrigos e Hijos	300, 600	P, G	N	0.30	3.00
Cristobal Llusa ²	TIU	100	Viuda de Llusa y R. Masia	300, 600	P, G	N	0.30	3.00
Delin CLD	TIV	100	Navy	—	O	N	—	3.00
Defin CLD	CLD	150	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Donato ²	EFD	150	Cia de Comm. S. A.	300, 600	P, G	N	0.30	3.00
Donastia ²	HNJ	150	Cia Anonima de Nav.	300, 600	P, G	N	0.30	3.00
Dorado ²	CLF	—	Navy	—	O	N	—	3.00
Durango ²	TIX	500	Cia Nav. Vascongada	300, 600	P, G	N	0.30	3.00
Eanchove ²	TLA	200	Cia Mar. Elanchove	300, 600	P, G	N	0.30	3.00
Elcano ²	TLB	300	A. F. Perez	300, 600	P, G	N	0.30	3.00
Emilia S. De Perez ²	ECB	243	Navy	—	O	N	—	3.00
Emperador Carlos V ²	EBE	150	Cia Maritima	300, 600	P, G	N	0.30	3.00
Enrique Ballesteros ²	CMN	150	Cia Maritima Ballesteros	300, 600	P, G	N	0.30	3.00
Eolo ²	CME	250	Cia Anonima Mar. Union	300, 600	P, G	N	0.30	3.00
Eretra Mendi ²	HMO	150	Cia Naviera Sota y Aznar	300, 600	P, G	N	0.30	3.00
Escalano ²	TIV	150	Cia Trasmediterranea	300, 600	P, G	N	0.30	3.00
Espana	EBA	—	Navy	—	O	N	—	3.00

Infanta Isabel de Bor-	EDI	430	Cia Trasatlantica ..	300, 600	P G	N	0,30	3,00
ben	EHP	—	Navy	—	O	—	—	—
Isaac Peral	TIJ	100	Vinda de Lhusa	300, 600	P G	N	0,30	3,00
Isabel de Lhusa	EFO	100	Cia Islana Mar.	300, 600	P G	N	0,30	3,00
Isa de Menorca	EDP	269	Cia Trasatlantica	300, 600	P G	N	0,30	3,00
Isa de Panay	EPI	100	Cia Islana Mar.	300, 600	P G	N	0,30	3,00
Iturri-Azlar	EMI	150	Cia Nav. "Iturri"	300, 600	P G	N	0,30	3,00
Iturri-Borra	HLE	150	Cia Nav. "Iturri"	300, 600	P G	N	0,30	3,00
Iturri-Gorri	HLG	150	Cia Nav. "Iturri"	300, 600	P G	N	0,30	3,00
Iturri-Urdina	TJL	100	Cia Nav. "Iturri"	300, 600	P G	N	0,30	3,00
Jacinto Verdague	EEV	—	Cia Trasmediterranea	300, 600	P G	X	0,30	3,00
Jaime Girona	ECJ	250	Altos Ornos de Vizcaya	300, 600	P G	—	—	—
Jaime I	EBC	550	Navy	—	O	—	—	—
Jaime Jerona	ECJ	250	Altos Hornos de Bizcaya	300, 600	P G	N	0,30	3,00
Jata Mendi	HMS	200	Cia Nav. Sota y Aznar	300, 600	P G	N	0,30	3,00
Jatiba	EEI	100	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
Jatiba d'Urgell	EEF	150	Hijos de Jose Taya	300, 600	P G	N	0,30	3,00
J. B. Llevera	EEH	100	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
J. C. Lhusa	TJM	100	Vinda de Lhusa y R. Masia	300, 600	P G	N	0,30	3,00
J. S. Sister	EES	180	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
Joaquin Pujol	TJN	100	Antonio Pujol	300, 600	P G	N	0,30	3,00
Jorge Juan	EEJ	180	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
José Taya	ENR	150	Hijos de J. Taya	300, 600	P G	N	0,30	3,00
José Villalonga	CMF	250	Altos Hornos de Vizcaya	300, 600	P G	N	0,30	3,00
Juan Maragall	HLI	150	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
Juliana	EDX	100	Cia Barcelonesa de Nav.	300, 600	P G	N	0,30	3,00
Junio	CMU	100	Cia Nav. Varacaldesa	300, 600	P G	N	0,30	3,00
Jupiter CMJ	CMJ	150	Cia Anonima Marit. Union	300, 600	P G	N	0,30	3,00
J. Verdagnet	EEV	150	Cia Trasmediterranea	300, 600	P G	N	0,30	3,00
Kanguro	CNL	150	Navy	—	O	—	—	—
Lauria	ERS	220	Navy	—	O	—	—	—
Laya	EBT	220	Navy	—	O	—	—	—
Lezarni	EDG	269	Cia Trasatlantica	300, 600	P G	N	0,30	3,00
Leon XIII	EDX	430	Cia Trasatlantica	300, 600	P G	N	0,30	3,00
Lilona	EXJ	150	El Naviero Domingo Numbro	300, 600	P G	N	0,30	3,00
Lily	TJO	150	Martinez Rivas	300, 600	P G	N	0,30	3,00
Luis A. Goni	TJP	100	Rada y Cia	300, 600	P G	N	0,30	3,00
Luis Casanova	TJQ	150	Vinda e Hijos de Luis Casanova	300, 600	P G	N	0,30	3,00
Lullo	EFL	100	Cia Islana Mar.	300, 600	P G	N	0,30	3,00
Macarena	HML	150	Don W. Gonzalez Garra	300, 600	P G	N	0,30	3,00
Madrid TJR	TJR	150	Figueras y Campos	300, 600	P G	N	0,30	3,00
Mallano	TJZ	—	Cia Islana Mar.	—	P G	N	0,30	3,00
Mahon	EEN	150	Cia Islana Mar.	300, 600	P G	N	0,30	3,00
Mallorca	EFK	200	Cia Nav. Amaya	300, 600	P G	N	0,30	3,00
Manu	TJS	200	Cia de Nav. Fabregas y garcia	300, 600	P G	N	0,30	3,00
Manuela Pla	CXP	150	Cia Trasatlantica	300, 600	P G	N	0,30	3,00
Manuel Calvo	EDM	269	Cia de Nav. Fabregas y garcia	300, 600	P G	N	0,30	3,00
Manuel Opaliu	CXE	150	Cia Mar. del Nervion	300, 600	P G	N	0,30	3,00
Mar Adriatico	TIT	200	Cia Mar. del Nervion	300, 600	P G	N	0,30	3,00
Mar Blanco	TJU	200	Cia Marit. del Nervion	300, 600	P G	N	0,30	3,00
Mar Cantabrico	TXV	150	Cia Marit. del Nervion	300, 600	P G	N	0,30	3,00
Mar Caribe	TIV	200	Cia Marit. del Nervion	300, 600	P G	N	0,30	3,00
Mar Caspio	EFG	200	Cia Marit. del Nervion	300, 600	P G	N	0,30	3,00
Mar del Norte	CXF	150	Cia Marit. del Nervion	300, 600	P G	N	0,30	3,00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
SPAIN—contd.									
Mar del Plata ..	TJW	150	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	Franks.
Margari ..	TJX	200	Cia Naviera Amaya ..	300, 600	P G	N	0.30	3.00	
Maria de Molina ..	EHW	100	Navy ..	300, 600	O	N	—	—	
Maria Elena ..	TJY	100	Luis Liano y Cia ..	300, 600	P G	N	0.30	3.00	
Maria Miagos ..	CML	150	Ampero, Zubiria y Cia ..	300, 600	P G	N	0.30	3.00	
Marianela ..	TJZ	100	Doriga y Casuso ..	300, 600	P G	N	0.30	3.00	
Maria Teresa ..	HMU	100	Ponte y Munis ..	300, 600	P G	N	0.30	3.00	
Mar Mediterraneo ..	CXJ	150	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	
Mar Negro ..	ECV	200	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	
M. Armas ..	HLM	150	Hijos de José Taya ..	300, 600	P G	N	0.30	3.00	
Marques del Turia ..	HLT	150	Cia Trasmediterranea ..	300, 600	P G	N	0.30	3.00	
Marques de Campo ..	CXW	150	Cia Trasmediterranea ..	300, 600	P G	N	0.30	3.00	
Marques de Chavari ..	HLW	150	Altos Hornos de Vizcaya ..	300, 600	P G	N	0.30	3.00	
Marques de Molins ..	EHU	—	Navy ..	—	O	N	—	—	
Marques de Urquijo ..	ECN	250	Altos Hornos de Vizcaya ..	300, 600	P G	N	0.30	3.00	
Marques de la Victoria ..	EHV	—	Navy ..	—	O	N	—	—	
Mar Rojo ..	ECH	200	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	
Marte CMM ..	CMH	150	Cia Anonima Marit. Union ..	300, 600	P G	N	0.30	3.00	
Martin Saenz ..	ECZ	300	Pinillos Izquierdo y Cia ..	300, 600	P G	N	0.30	3.00	
Mar Tirreno ..	ECM	150	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	
Menorquin ..	CMQ	100	Cia Bilbaína de Nav. ..	300, 600	P G	N	0.30	3.00	
Mercedes CXD ..	ECQ	150	Cia Isla Maritima ..	300, 600	P G	N	0.30	3.00	
Mercurio ..	CXD	100	Cia de Nav. Bengolea ..	300, 600	P G	N	0.30	3.00	
M. L. Villaverde ..	TKA	150	Hijos de J. Barreras ..	300, 600	P G	N	0.30	3.00	
M. M. Pinillos ..	EDW	108	Cia Trasatlantica ..	300, 600	P G	N	0.30	3.00	
Mirentxu ..	ECP	300	Pinillos Izquierdo y Cia ..	300, 600	P G	N	0.30	3.00	
Monte Toro ..	HMB	100	Federico Power ..	300, 600	P G	N	0.30	3.00	
Montevideo EDV ..	EFT	150	Cia Isla Maritima ..	300, 600	P G	N	0.30	3.00	
Montserrat ..	EDV	270	Cia Trasatlantica ..	300, 600	P G	N	0.30	3.00	
Mouro ..	ECO	180	Cia Trasatlantica ..	300, 600	P G	N	0.30	3.00	
Navarra EDY ..	EDY	100	Cia Vasco Cantabrica de Nav. ..	300, 600	P G	N	0.30	3.00	
Navarra EEX ..	EDX	100	Cia Naviera Mundaca ..	300, 600	P G	N	0.30	3.00	
Nautilus ..	EBV	100	Cia Trasmediterranea ..	300, 600	P G	N	0.30	3.00	
Nuria ..	CMC	—	Navy ..	—	O	N	—	—	
Ogona ..	CXG	150	Cia Barceloneta de Nav. ..	300, 600	P G	N	0.30	3.00	
Oiz ..	CMP	150	Cia de Nav. La Blanca ..	300, 600	P G	N	0.30	3.00	
Olaveria ..	CMO	150	Banco Urquijo, Madrid ..	300, 600	P G	N	0.30	3.00	
Olesa ..	TLB	100	Cia Marit. del Nervion ..	300, 600	P G	N	0.30	3.00	
Ollargan ..	CXL	100	S. A. Naviera Espanola ..	300, 600	P G	N	0.30	3.00	
			Cia de Nav. La Blanca ..	300, 600	P G	N	0.30	3.00	

Onion	100	CXN	Cia de Nav. La Blanca	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Quendo	150	CXQ	Cia de Nav. La Blanca	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Orduña Mendi	200	HMT	Cia Naviera Sota y Aznar	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Orarosa	100	TKB	Zarauz, Rodrigo y Saracho	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Oso	—	EBO	Navy	—	O	..	—	O	..	N	0.30	—
Oyoyo	150	CXO	Cia de Nav. La Blanca	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Paulina	150	HLP	Cia de Barcelonés de Nav.	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Paz	100	HNT	Zarauz, Rodrigo y Saracho	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Paz de Epatza	150	TKT	Cia Naviera Bidasoa	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
P. Claris	150	ECL	Hijos de J. Taya	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Pelayo	270	EBD	Navy	—	O	..	—	O	..	N	0.30	—
Peña Angustina	150	TKD	Cia Iberica de Telecomm.	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Peña Cabarga	150	TKE	Cia Nav. Vizcaya	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Peña Cabarga	150	TKF	Cia Sautandrina	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Peña Rocas	150	HLO	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Peris Valero	150	TKG	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Poeta Querol	100	TKH	La Previsora Naval	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Previsor	324	EBG	Navy	—	O	..	—	O	..	N	0.30	—
Princesa de Asturias	200	EHR	Navy	—	O	..	—	O	..	N	0.30	—
Proserpina	430	EDS	Cia Trasatlantica	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
P. Saristegui	150	CMR	Cia Nav. Euzkera	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Ramón	150	TKI	Cia Naviera Bidasoa	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Ramón de Bikuña	150	TKK	Cia Near. Espanola	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Ramonita	200	TKJ	Domingo Mumburu	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Ramón Mumburu	220	EBU	Navy	—	O	..	—	O	..	N	0.30	—
Recaide	430	EDK	Cia Trasatlantica	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Reina Maria Cristina	270	EBH	Navy	—	O	..	—	O	..	N	0.30	—
Reina Regente	300	EFV	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Reina Victoria	430	EDU	Cia Trasatlantica	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Reina Victoria Eugenia	200	EFJ	Cia Isla Maritima	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rey Jaime I	200	EFS	Cia Isla Maritima	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rey Jaime II	—	EBK	Navy	—	O	..	—	O	..	N	0.30	—
Rio de la Plata EBK	150	HNR	Hijorde J. Taya	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rita HLR	150	HNA	Hijos de Enrique Gironella	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rita HLR	150	HLF	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Roger de Flor	150	ECQ	Jose Maria Caballero	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Roger de Lluvia	150	TKL	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Romeu	100	TKM	Mateo Olaso	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rontegui	150	ECS	Cia Naviera Guipuzcoana	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rosario ECS	100	TKN	Viuda de Llusa y R. Masia	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Rosendo Masia	180	EEF	Cia Transmediterranea	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Salvador EFF	100	EFF	Cia de Nav. Salvador	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Salvador	150	HLV	Uribe y Eguiraun	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Sebastian	200	TKO	F. Sanz é Inchausti	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Sedecia	150	HND	Cia Maritima Bilbao	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Serafin Ballesteros	150	TKR	Cia Maritima Ballesteros	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Serra	150	HLS	T. Fierro é Hijos	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
Submarino A. 1	—	EHX	Navy	—	O	..	—	O	..	N	0.30	—
Submarino A. 2	—	EHV	Navy	—	O	..	—	O	..	N	0.30	—
Submarino A. 3	150	EHZ	Hijos de J. Taya	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
S. Ana	250	TKP	Cia Trasatlantica	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
S. Carlos	270	EDJ	Cia Trasatlantica	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
S. Isabel	150	EDJ	Hijos de J. Taya	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
S. José	100	CXX	Ruperto de Mendiguren	300, 600	P G	..	300, 600	P G	..	N	0.30	3.00
S. Mamés	—	TKX	—	—	P	..	—	P	..	N	0.30	—

	N	U.S.	3000
Hijos de Enrique Gironella	150	..	300, 600
Cia Transmediterranea	250	..	300, 600
Sota y Aznar	250	..	300, 600
Sota y Aznar	200	..	300, 600
Sota y Aznar	200	..	300, 600
Cia Espanola de Nav.	100	..	300, 600
Wenceslao Gonzalez Garra	100	..	300, 600
Valentin	150	..	300, 600
Cia Naviera Valmurian	100	..	300, 600
Alejandro Litani	100	..	300, 600
Cia Transmediterranea	180	..	300, 600
Cia Transmediterranea	180	..	300, 600
Cia Transmediterranea	180	..	300, 600
Altos Hornos de Vizcaya	150	..	300, 600
Navy	140	..	300, 600
S. A. Naviera Espanola	150	..	300, 600
Hijos de Francisco deza	150	..	300, 600
Gutierrez Hermanos	150	..	300, 600
Jose Zarauz Villadrid	100	..	300, 600
Cia Transmediterranea	180	..	300, 600
Cia Naviera Gascuna	150	..	300, 600
Vuela de Lusa y R. Masia	100	..	300, 600
Manuel Lopez Marin	150	..	300, 600
Wenceslao Jonraltz Jarra	150	..	300, 600
Cia Naviera Guipuz Coana	150	..	300, 600
Cia Naviera Guipuz Coana	150	..	300, 600
Trafikaktiebolaget Grangesberg-Oxelösund	150	P	300, 450, 600
Stockholms Rederiaktiebolag Sva (Trälleborg-Sassnitz Line)	100	P	300, 600
Rederiaktiebolaget Transatlantic (Gottenburg S. Africa Line)	250	P	300, 600
Rederiaktiebolaget Transatlantic	250	P	300, 600
Rederiaktiebolaget Svenska Lloyd	250	P	300, 600
Rederiaktiebolaget Nordstjernen	350	P	300, 600
Navy	—	O	—
Rederiaktiebolaget Transatlantic	250	P	300, 600
Angfartygsaktiebolaget Tirfing	350	P	300, 600
Rederiaktiebolaget Transatlantic	250	P	300, 600
Rederiaktiebolaget Transatlantic	250	P	300, 600
Triini *	HNL	..	..
Turia *	EFU	..	..
Umbe-Mendi *	HMV	..	..
Upo-Mendi *	HMW	..	..
Urko-Mendi *	HMX	..	..
Valencia CMX	HMV	..	..
Valentin *	KMX	..	..
Velaurian *	TKV	..	..
Vicente Ferrer *	TKW	..	..
Vicente La Roda *	HME	..	..
Vicente Puchol *	EER	..	..
Victor Chavarri *	EER	..	..
Villamil *	CEP	..	..
Villarana *	CMG	..	..
Vilagraci *	FBP	..	..
Villanarique *	TKZ	..	..
Villaodrid *	EFW	..	..
Villaleal EEW *	HNF	..	..
Villasandino *	CXV	..	..
Vuela de Lusa *	EEW	..	..
Wenceslao *	HNG	..	..
Yandola *	TKK	..	..
Yute *	TKV	..	..
SWEDEN	HNK	..	..
Abisko ..	CXY	..	..
Aeolus ..	EDE	..	..
Africanic ¹	SFL	..	..
Alstern ²	SHC	..	..
Anglia SIA ³	SFS	..	..
Annie Johnson *	SJA	..	..
Aran ..	SIA	..	..
Aspen ¹ ..	SHH	..	..
Atlant ² ..	SBH	..	..
Atlantic ¹	SHG	..	..
Australic ¹	SHY	..	..
	SFT	..	..
	SFH	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
SWEDEN—contd.									
Axel Johnson ²	SGK	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	⁷ 2400 to 0030, 0800 to 0830, 1200 to 1230, 1600 to 1630, 2000 to 2030. (Local Mean Time) ⁸ The station is open the last 20 minutes of each hour, from 0740 to 1800. (Local Mean Time)
Balboa ²	SHX	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Balder ²	SGO	200	Rederiakt-Svenska Lloyd	300, 600	P G ..	N	0.40	2.80	
Baltic SFU ¹	SFU	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	— ⁴	0.40	4.00	
Bele ² ..	SGP	200	Rederiaktiebolag Svenska Lloyd	300, 600	P G ..	N	0.40	2.80	
Bernicia ²	SIW	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Birger Jarl ²	SHD	100	Stockholms Rederiaktiebolag Svea	300, 600	P ..	— ⁴	0.28	2.80	
Blenda ¹	SBX	—	Navy	—	O ..	—	—	—	
Boden ¹	SFW	150	Träfskaktiebolaget Grangesberg-Oxelösund	300, 600	P ..	0800 to 0815 1200 to 1215 1600 to 1615 2000 to 2015	0.40	4.00	
Bolmen ¹	SHA	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	— ⁴	0.40	4.00	
Bris ² ..	SHT	250	Rederiaktiebolaget Bore	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Buenos Aires SIU ²	SIU	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	— ⁴	0.40	4.00	
Bullaren ²	SHN	250	Rederiaktiebolaget Transatlantic	300, 600	P G ..	— ⁴	0.40	4.00	
Carlsbom ¹	SGR	350	Svenska America-Mexico Linjen	300, 600	P ..	X	0.40	4.00	
Carmen SIP ²	SIP	200	Rederiaktiebolaget Carmen ..	300, 600	P ..	0600 to 0700	0.40	4.00	
Catalonia ²	SID	250	Rederiaktiebolaget Svenska Lloyd	300, 600	P ..	1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Cavalla ²	SIK	250	Rederiaktiebolaget Sverige-Levan-ten	300, 600	P ..	— ⁴	0.40	4.00	

Ceylon SGY ¹	SGY	350	Swedish East Asiatic Co.	300, 600	P	..	—	0.40	4.00
Claes Horn	SBQ	—	Navy	—	O	..	—	—	—
Claes Flemming	SCB	—	Navy	—	O	..	—	—	—
Dristighetten	SCC	—	Navy	—	O	..	—	—	—
SBW	SCD	—	Navy	—	O	..	—	—	—
Drott .. Sophia	SHK	350	Rederiaktiebolaget Nordstjernan	300, 600	P	..	0.60 to 0.700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80
Drottning Viktoria	SEB	100	State Railways (Sassnitz-Trällebörg Line)	300, 375, 600	P R, O	..	X	—	—
Edda	SBV	—	Navy	—	O	..	—	—	—
Egil	SIN	100	Stockholms Rederiaktiebolag Svea	300, 600	P G	..	0.300 to 0.400 0.700 to 0.800 1100 to 1200 1500 to 1600 1900 to 2000	0.28	2.80
Faxen	SHU	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	0.600 to 0.700 1300 to 1400 1800 to 1900	0.28	2.80
Fvleja	SBM	—	Navy	—	O	..	—	—	—
G. D. Kennedy	SGV	100	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	0.40	4.00
Göta	SBG	—	Navy	—	O	..	—	—	—
Gullmar	SIG	150	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	0.40	4.00
Gustavsbohm	SIH	250	Aktie, Svenska Amerika-Mex. Linjen	300, 600	P	..	—	0.40	4.00
Hansa	SHO	150	Angfartsktiebolaget Gotland	300, 600	P G	..	N	0.28	2.80
Harald	SIE	100	Göteborgs Bogserrings Aktie.	300, 600	P	..	X	0.28	2.80
Heimdall	SGH	100	Stockholms Rederiaktiebolag Svea	300, 600	P G	..	0.300 to 0.400 0.700 to 0.800 1100 to 1200 1500 to 1600 1900 to 2000 2300 to 2400	0.28	2.80
Hellenic ¹	SFF	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	0.700 to 0.800 1100 to 1200 1500 to 1600 1900 to 2000 2300 to 2400	0.40	4.00
Hermes SIM	SIM	100	Bergnings- och Dykert-Aktie. Neptun.	300, 600	P	..	0.700 to 0.800 1100 to 1200 1500 to 1600 1900 to 2000 2300 to 2400	0.40	4.00
Holmia	SIQ	250	Rederiaktiebolaget Svenska Lloyd	300, 600	P	..	0.600 to 0.700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00
Hugin	SCE	—	Navy	—	O	..	—	—	—
Indianic ¹	SFE	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	0.40	4.00
Isbrytaren II	SHR	150	Ice boat belonging to the City of Stockholm	300, 600	P	..	—	—	—
Italia SIV	SIV	250	Rederiaktiebolaget Svenska Lloyd	300, 600	P	..	0.600 to 0.700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00
Jacob Bagge	SBP	—	Navy	—	O	..	—	—	—
Japan ¹	SGX	350	Swedish East Asiatic Co.	300, 600	P	..	—	—	—
John Ericsson	SBN	—	Navy	—	O	..	—	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
SWEDEN—contd.									
Konung Gustaf V. *	SEA	100	State Railways (Sassnitz-Tralleborg Line)	300, 375, 600	P R, O..	X	—	—	
Kratos ¹ , ..	SFQ	250	Rederiaktiebolaget Transatlantic	300, 600	P ..	— ⁴	0.40	4.00	
Kronprinsessan Margareta *	SFY	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	
Kronprinsessan Victoria *	SGB	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	
Kronprins Gustaf *	SHL	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	
Kronprins Gustaf Adolf *	SFV	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	
Liguria SIB *	SIB	250	Rederiaktiebolaget Svenska Lloyd	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Lima SHJ *	SHJ	350	Rederiaktiebolaget Nordstjernan	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28	2.80	
Lombardia SIX *	SIX	250	Rederiaktiebolaget Svenska Lloyd	300, 600	P ..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.40	4.00	
Magda *	SHS	250	Afrikanska Angfartygs Aktie. ..	300, 600	P ..	— ⁷	0.40	4.00	
Magne ..	SBZ	—	Navy	—	O ..	—	—	—	
Malmo ² , ..	SED	100	State Railways (Malmö-Copenhagen Line)	300, 375, 600	O ..	X	—	—	
Manligheteh ..	—	—	Navy	—	O ..	—	—	—	

Masillo *	SIC	250	Rederiaktiebolaget Svenska Lloyd	300, 800	P	1100 to 1200 1400 to 1500 1800 to 1900 0800 to 0815 1200 to 1215 1600 to 1615 2000 to 2015	4.00
Mertainen *	SIT	250	Trafikaktiebolaget Grangesberg-Oxelösund	300, 800	P	0.40	4.00
Mjörn ..	SIC	100	Rederiaktiebolaget Transatlantic	300, 800	P	0.28	2.80
Mode ..	SHY	—	Navy ..	—	O	—	—
Munin ..	SCF	—	Navy ..	—	O	—	—
Narvik *	SFX	150	Trafikaktiebolaget Grangesberg-Oxelösund	300, 800	P	0.40	4.00
Njord ..	SBF	—	Navy ..	—	O	—	—
Nippon SIO *	SIO	350	Swedish East Asiatic Co.	300, 800	P	0.40	4.00
Nordic *	SGO	250	Rederiaktiebolaget Transatlantic	300, 800	P	0.40	4.00
Oaxen V. *	SGN	100	Aktie. Karta & Oaxens Kalkbruk	300, 800	P	—	—
Odessa SII *	SII	250	Rederiaktiebolaget Sverige-Levanten	300, 800	P	0.40	4.00
Örnen ..	SBO	—	Navy ..	—	O	—	—
Oscar II SBL ..	SBL	—	Navy ..	—	O	—	—
Oscar Fredrik *	SHM	350	Rederiaktiebolaget Nordstjernen	300, 800	P	0.28	2.80
Pacific SFZ *	SFZ	350	Rederiaktiebolaget Nordstjernen	300, 800	P	0.28	2.80
Patricia SHW *	SHW	200	Rederiaktiebolaget Svenska Lloyd	300, 800	P G	0.40	4.00
Pedro Christophersen *	SGE	350	Rederiaktiebolaget Nordstjernen	300, 800	P	0.28	2.80
Peking *	SHV	350	Swedish East Asiatic Co.	300, 800	P	0.40	4.00
Prinsessan Ingeborg *	SHB	350	Rederiaktiebolaget Nordstjernen	300, 800	P	0.28	2.80
Psilander ..	SBS	—	Navy ..	—	O	—	—
Ragnar ..	SCB	—	Navy ..	—	O	—	—
Ragne ..	SIV	200	Stockholms Rederiaktiebolag Svea.	300, 800	P G	0.40	4.00
Rota SBT ..	SBT	—	Navy ..	—	O	—	—
Saga SFB *	SFB	150	Angf. Aktieb. Thule	300, 800	P G	0.28	2.80
Sagoland *	SFG	350	Angfartsaktiebolaget Tirding	300, 800	P	0.40	4.00
Salen *	SIR	250	Rederiaktiebolaget Transatlantic	300, 800	P	0.40	4.00
San Francisco SGC *	SGC	350	Rederiaktiebolaget Nordstjernen	300, 800	P	0.28	2.80
Sigurd ..	SCC	—	Navy ..	—	O	—	—
Siljan *	SGJ	250	Rederiaktiebolaget Transatlantic	300, 800	P	0.40	4.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
SWEDEN—contd.									
Sir Ernest Cassel ¹	..	SFP	150	Trafikaktiebolaget Grängesberg-Oxelösund	300, 600	P	..	0800 to 0815 1200 to 1215 1600 to 1615 2000 to 2015	0.40 4.00
Skagerak ²	..	SEC	70	Government	300, 600	P	..	0630 to 0730 0930 to 1130 1430 to 1530 1630 to 1730	—
Skagern ¹	..	SGU	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	0.40 4.00
Skaggald	..	SGJ	—	Navy	—	O	..	—	—
Skuld	..	SBU	—	Navy	—	O	..	—	—
Sonja ²	..	SIZ	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—
Stockholm ²	..	SGL	250	Rederiaktiebolaget Sverige Nord-Amerika	300, 600	P	..	N	0.40 4.00
Stureholm ²	..	SIL	350	Aktie Svenska Amerika Linjen	300, 600	P	..	—	0.40 4.00
Suecia ²	..	SGT	350	Rederiaktiebolaget Nordstjernan	300, 600	P	..	0600 to 0700 1100 to 1200 1400 to 1500 1800 to 1900	0.28 2.80
Sumatra SGD ¹	..	SGD	350	Swedish East Asiatic Co.	300, 600	P	..	—	0.40 4.00
Svarten ²	..	SIS	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—
Svea	..	SBA	—	Navy	—	O	..	—	—
Svenskund	..	SKA	—	Navy	—	O	..	—	—
Sverige	..	SKB	—	Navy	—	O	..	—	—
Sydic ²	..	SGF	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—
Tapperheten	..	SBJ	250	Navy	—	O	..	—	—
Tasmanic ¹	..	SFG	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—
Texas SFD ¹	..	SFD	200	Rederiaktiebolaget Transatlantic Svenska Amerika-Mexico Linjen	300, 600	P	..	2400 to 0015 0600 to 0815 0800 to 1215 1200 to 1615 2000 to 2015	0.40 4.00 0.10 4.00 4.00
Thor	..	SBE	—	Navy	—	O	..	—	—
Thordon	..	SCH	—	Navy	—	O	..	—	—
Thule SVE	..	SVE	200	Rederiaktiebolaget Svenska Linjen	300, 600	P	..	—	—
Thule SVE	..	SVE	200	Rederiaktiebolaget Svenska Linjen	300, 600	P	..	—	—
Turner ²	..	SFJ	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—
Turner ²	..	SFJ	250	Rederiaktiebolaget Transatlantic	300, 600	P	..	—	—

Line	Ship	Company	Port of Origin	Port of Destination	Agent	Remarks
1	Tirang	..	..	..	..	..
2	Tisaren	..	..	..	..	..
3	Torne	..	..	..	..	..
4	Turbinia SHZ	..	..	..	..	..
5	Valparaiso	..	..	..	..	..
6	Va na	..	..	..	..	..
7	Vidar	..	..	..	..	..
8	Vinga	..	..	..	..	..
9	Vollrath Tham	..	..	..	..	..
10	Wachtmeister	..	..	..	..	..
11	Wale	..	..	..	..	..
12	Wasa	..	..	..	..	..
13	Wrangel	..	..	..	..	..
14	Yeddo	..	..	..	..	..
UNITED KINGDOM						
15	Abadesa	..	..	..	..	..
16	Abaris	..	..	..	..	..
17	Abassieh	..	..	..	..	..
18	Abercorn	..	..	..	..	..
19	Aberdonian	..	..	..	..	..
20	Aberdeen	..	..	..	..	..
21	Abertour	..	..	..	..	..
22	Abinsi	..	..	..	..	..
23	Abonema	..	..	..	..	..
24	Acacutia	..	..	..	..	..
25	Acra	..	..	..	..	..
26	Achilbster	..	..	..	..	..
27	Actor	..	..	..	..	..
28	Admiral	..	..	..	..	..
29	Admiral Cochrane	..	..	..	..	..
30	Admiral Codrington	..	..	..	..	..
31	Admiral Hamilton	..	..	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.									
Admiral Hastings ¹	GCDR	155	Byron S.S. Co., Ltd.	300, 600	P G	X	0.40	—	¹¹ Operated by Comp. Française Maritime et Coloniale de Télégraphie, Paris, for and on behalf of the Marconi International Marine Co., Ltd., London
Adolph Woermann ¹	GHSL	—	Aberdeen Line (G. Thompson & Co.)	300, 600	P G	X	0.40	—	
Adra ¹	YHL	155	English and American S.S. Co.	300, 600	P G	X	0.40	—	
Adriatic ¹	MHC	300	Oceanic S.N. Co.	300, 600	P G	X	0.40	—	
Adventure ¹	GBSJ	—	—	300, 600	P G	X	0.40	—	
Aeneas ¹	MFU	250	Ocean S.S. Co.	300, 600	P G	X	0.40	—	
Africshore ¹	VNL	—	Mitchell Cotts & Co.	300, 600	P G	X	0.40	—	
Agadir ¹ GCQR	GCKJ	140	Royal Mail S.S. Co.	300, 600	P G	X	0.40	—	¹² Operated by Canadian Government Radiotelegraph Service, Department of Naval Service, Ottawa
Agamemnon ZJK ¹	ZJK	140	Ocean S.S. Co.	300, 600	P G	X	0.40	—	
Agapenor ¹	ZJP	220	Ocean S.S. Co.	300, 600	P G	X	0.40	—	
Agula ¹	FJF	180	Agula S.S. Co.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	¹³ Operated by Admiralty
Aidan ¹	MFM	200	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	¹⁴ Operated by the Radio Corps. of America
Ainsdale ¹	XIP	150	Alby United Carbide Factories, Ltd.	300, 600	P G	X	0.15 ²¹	1.90 ²¹	¹⁵ Operated by the officers of the ship
Airedale ¹	OFT	150	C. A. Stewart & Co.	300, 600	P G	X	0.40	—	¹⁶ Private yacht
Ajana ¹	GTT	250	Australind S.S. Co.	300, 450, 600	P G	0915 to 1300 1630 to 2400	0.40	—	¹⁷ Operated by Marconi Wireless Telegraph Co. of Canada, Ltd.
Ajax ¹	GUZ	200	Ocean S.S. Co.	300, 600	P G	X	0.40	—	¹⁸ Operated by the Marconi International Marine Communication Co., Ltd., on behalf of Amalgamated Wireless (Australia), Ltd.
Akabo ¹	MZE	170	British and African S. N. Co.	300, 600	P G	X	0.40	—	
Alamagro ¹	GCKJ	—	MacAndrews & Co.	300, 600	P G	X	0.40	—	
Alaska ¹	XUN	—	Furness, Withy & Co.	300, 600	P G	X	0.40	—	
Alatrium ¹	LUO	125	Rome S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Alaveno ¹	YHN	160	Atlantic & Eastern S.S. Co.	300, 600	P G	0700 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	¹⁹ In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is 17 centimes per word, minimum 1 fr. 70 centimes. In the case of radiotelegrams exchanged with French coast stations, the coast charge is 15 centimes per word, minimum 1 fr. 50 centimes
Alban ²	GWV	225	Booth S.S. Co., Ltd.	300, 450, 600	P G	X	0.40	—	
Albanian ¹	ZOI	180	F. Leyland & Co., Ltd.	300, 600	P G	X	0.40	—	
Albatross ¹	YDL	120	Shipping Controller (Ellermann Wilson & Co.)	300, 600	P G	X	—	1.50 ¹⁹	
Alberta YJT ¹	YJT	150	L. & S.W. Railway Co.	300, 600	P G	X	0.15 ¹⁹	—	
Albana ¹	LUI	160	Sale & Co.	300, 600	P G	X	0.04	—	
Albionstar ¹	GCBD	200	Blue Star Line, Ltd.	300, 600	P G	X	0.40	—	
Albistan ¹	YFW	130	Pentastar S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Albion ¹	LTM	150	Chr. Salvesen & Co.	300, 600	P G	X	0.40	—	
Albion ¹	ZJC	300	Ocean S.S. Co.	300, 600	P G	X	0.40	—	

	YSL	—	Anglo-Newfoundland Development Co.	300,000	P	X	0.40	coast stations of the United Kingdom, the coast charge is 17 cents per word, minimum 1 fr. 70 centimes. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is 33 centimes per word, minimum 3 fr. 30 centimes Two motor lifeboats equipped with wireless telegraph apparatus are carried by this ship Normally employs 450 metre wavelength Normally employs 400 metre wavelength Operated by the S. A. Internationale de Télégraphie sans Fil
Alcanda ¹	ZPF	130	J. Westoll ..	300,600	P G	..	0.40	—
Aldworth ¹	GBZQ	180	Pacific S.N. Co. ..	300,000	P G	..	0.40	—
Alda	ZVU	180	Ellerman's Wilson Line, Ltd.	300,000	P	..	0.40	—
Aleppo ¹	ZUE	150	Cable Ship (General P.O.)	300,000	P	..	0.40	—
Alert	ZQU	180	India Office (mgrs., Grambs & Co.)	300,000	P G	..	0.40	—
Alesia ¹	BCKX	135	Alexandra Towing Co. ..	300,600	P G	..	0.40	—
Alexandra YZH ¹	VZH	135	Woolston S.S. Co. ..	300,600	P G	..	0.40	—
Alexandra Woermann ¹	GBFM	180	Oceanic S.N. Co. ..	300,600	P G	..	0.40	—
Alexandrian ¹	ZGM	170	F. Leyland & Co., Ltd. ..	300,600	P G	..	0.40	—
Algierian Prince ¹	GCMY	170	Prince Line, Ltd.	300,600	P G	..	0.40	—
Alicia ¹	XFBJ	125	T. G. Beattley & Son, Ltd.	300,600	P G	..	0.40	—
Alma ¹	GBJL	140	Shipping Controller (mgrs., E. T. Radcliffe & Co.)	300,600	P G	..	0.40	—
Almanzora ¹	YZK	—	Royal Mail Steam Packet Co. ..	300,600	P G	..	0.40	—
Almeria ¹	GBFD	155	Shipping Controller (mgrs., J. Gardner & Co.)	300,600	P G	..	0.40	—
Alpine Range ¹	YGH	140	Neptune S.N. Co.	300,600	P G	..	0.40	—
Alster ¹	GBDL	—	Shipping Controller (mgrs., Turnbull Scott & Co.)	300,600	P G	..	0.40	—
Alston ¹	YKH	140	Wm. Garthwaite ..	300,600	P G	..	0.40	—
Altai ¹	ZSX	140	Shipping Controller (mgrs., Eller- man's Wilson Line)	300,600	P G	..	0.40	—
Altentfels ¹	GBDZ	—	Shipping Controller (mgrs., P. Henderson & Co.)	300,600	P G	..	0.40	—
Alvarado	GCKL	—	MacAndrews & Co.	300,600	P G	..	0.40	—
Amarna ¹	VRD	150	Moss S.S. Co., Ltd.	300,600	P G	..	0.40	—
Amasis ¹	YMT	160	Moss S.S. Co., Ltd.	300,600	P G	..	0.40	—
Amatonga ¹	ZPU	150	Ellerman & Bucknall S.S. Co. ..	300,600	P G	..	0.40	—
Ambassador ¹	GXS	130	Hall Bros. S.S. Co., Ltd. ...	300,600	P G	..	0.40	—
Amber ¹	ZVE	130	Eastern Telegraph Co.	300,450,600	P G	..	0.40	—
Amberth ¹	GFI	—	Carlton S.S. Co.	300,600	P G	..	0.40	—
American Transport ¹	ZDP	140	Empire Transport Co.	300,600	P G	..	0.40	—
Ammon ¹	GBPZ	—	Shipping Controller (mgrs., Glover Bros.)	300,600	P G	..	0.40	—
Amsterdam ¹	GPF	130	Great Eastern Railway ..	300,450,600 ¹³	P G	..	0.40	—
Anamba ¹	ZAV	140	Anglo-Saxon Petroleum S.S. Co., Ltd.	300,600	P G	..	0.40	—
Anchises ¹	MFV	250	Ocean S.S. Co., Ltd.	300,600	P G	..	0.40	—
Anchoria ¹	YDE	180	I. & J. Hrocktebank, Ltd. ..	300,600	P G	..	0.40	—
Ancobra ¹	YMK	160	African S.S. Co.	300,600	P G	..	0.40	—
Andalusian ¹	XIC	130	Ellerman's Lines, Ltd.	300,600	P G	..	0.40	—
Andean MRQ ¹	MSO	200	Royal Mail Steam Packet Co. ..	300,600	P G	..	0.40	—
Andorra ¹	MIU	130	Andorinha S.S. Co., Ltd.	300,600	P G	..	0.40	—
Andrea ¹	ENR	350	Green Star Shipping Co., Ltd.	300,600	P G	..	0.40	—
Anglesea ¹	BCR	120	Cardigan S.S. Co., Ltd. (mgrs. Jenkins Bros.)	300,600	P G	..	0.40	—
Anglia GCMK ¹	GCMK	—	London & N. Western Ry. Co.	300,600	P G	..	0.40	—
Anglier ¹	VAG	125	Lloyd Royal Belge ..	300,600	P G	..	0.40	—
Anglo-Chilean ¹	ZRS	170	Nitrate Producers S.S. Co., Ltd....	300,600	P G	..	0.40	—
Anglo-Egyptian ¹	YUM	160	Nitrate Producers S.S. Co., Ltd....	300,600	P G	..	0.40	—
Anglo-Mexican ¹	YYC	140	Nitrate Producers S.S. Co., Ltd....	300,600	P G	..	0.40	—
Anglo-Saxon ¹	GUB	140	Nitrate Producers S.S. Co., Ltd....	300,600	P G	..	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Angora ¹	GCOR	220	British India S.N. Co. ..	300, 800	P G	X	—	—	
Anna Doretta Boog ¹	GBXK	—	C. Doresa & Co. ..	300, 600	P G	X	0.40	—	
Anne ¹ ..	GCXY	—	Shipping Controller (F. C. Strick & Co., Ltd.)	300, 600	P G	X	0.40	—	
Anni ¹ ..	GBYJ	—	Shipping Controller (Hall Bros.) ..	300, 600	P G	X	—	—	
Anselm ¹	MDK	180	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Anselma de Larrinaga ¹	EJR	180	Anselma de Larrinaga S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Ansald ¹	GBYL	—	Cunard S.S. Co. ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Antar ¹ ..	MCX	135	Egypt & Levant S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Antonia EVA ¹	EUA	130	Egypt & Levant S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Antiochian ¹	MIL	200	F. Leyland & Co., Ltd. ..	300, 600	P G	X	0.40	—	
Antinous ¹	GTC	140	Ocean S.S. Co., Ltd. ..	300, 450, 800	P G	X	0.40	—	
Antiope ¹	ZCN	135	Egypt & Levant S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Antiope ¹	GMX	130	Egypt & Levant S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Antonio EXN ¹	EXN	130	Egypt & Levant S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Anturum ¹ ..	GNP	130	Midland Railway Co. ..	300, 600	P G	X	0.40	—	
Autwerpen ¹ ..	GBMP	130	Shipping Controller (W. A. Young & Co.)	300, 400, 600 ³⁴	P G	X	0.40	—	
Apollo GXC ¹	GXC	160	Rolvian General Enterprise, Ltd.	300, 800	P G	X	0.40	—	
Appalachee GCQS ¹	GCQS	140	Anglo-American Oil Co., Ltd.	300, 800	P G	X	0.40	—	
Appam ¹ ..	GDI	250	British and African N.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Appbranch ¹ ..	GCND	170	Nautlus S.S. Co. ..	300, 800	P G	X	0.40	—	
Appieby ¹ ..	BAK	170	Norfolk and N. American S.S. Co.	300, 800	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Appleat ¹	ZVI	200	Lane & MacAndrew, Ltd.	300, 800	P G	X	0.40	—	
Aspley ¹ ..	BCG	145	Fawcett, Coverdale & Co., Ltd. ..	300, 800	P G	X	0.40	—	
Aspleyhall ¹	MSU	150	West Hartlepool S.N. Co., Ltd. ..	300, 800	P G	X	0.40	—	
Aquitania ¹ ..	GBPD	150	Shirard S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Arabia ¹ ..	GBPD	150	Shirard S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Arabian Prince ¹	XIV	150	Co., Ltd.) Controller (Halden & Co., Ltd.)	300, 800	P G	X	0.40	—	
Arabian Prince ¹	GBXK	150	Anglo-American Oil Co., Ltd.	300, 800	P G	X	0.40	—	
Arcturion ¹	YAV	150	Gordon S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Anchura ¹	MBG	150	Royal Mail Steam Packet Co. ..	300, 800	P G	X	0.40	—	
Anchura ¹	MBG	150	Royal Mail Steam Packet Co. ..	300, 800	P G	X	0.40	—	

Algodas	160	MBG	Royal Mail Steam Packet Co.	300, 800	P G	N	0.40
Anguaya ¹	160	GUA	Booker Bros., MacConnell & Co.	300, 800	P G		0.40
Arakaka ¹	140	GUA	Aral S.S. Co.	300, 800	P G		0.40
Aral ¹	135	ZVF	MacAndrew & Co., Ltd.	—	P G		—
Arana ¹	115	GCKT	British India S.N. Co., Ltd.	300, 800	P G		0.40
Arankola GCQT ¹	180	GCKT	Petroleum S.S. Co., Ltd.	300, 800	P G		0.40
Aras ¹	120	YZP	Shaw, Savill & Albion Co., Ltd.	300, 800	P G		0.40
Arawa ¹	200	MWE	R. Brining & Co.	300, 800	P G		0.40
Arbesco ¹	130	EIM	Dundee, Perth & London S.S. Co., Ltd.	300, 800	P G		0.40
Arbroath ¹	150	YPX	Great Eastern Railway	300, 450, 800 ²¹	P G	N	0.40
Archangel ²	120	ZCP	Liverpool, Brazil and River Plate S.N. Co., Ltd.	300, 800	P G	X	0.40
Archimedes ¹	170	YQC	Charente S.S. Co.	300, 800	P G	X	0.40
Architect ¹	180	ZHH	West Hartlepool S.N. Co., Ltd.	300, 800	P G	X	0.40
Ardenhall ¹	140	YCE	Ardeola S.S. Co.	300, 800	P G	X	0.40
Ardeola ¹	180	GCJ	Ard. Steamers, Ltd.	300, 800	P G	X	0.40
Argo ¹	140	YVA	Ard. Steamers, Ltd.	300, 800	P G	X	0.40
Argowan ¹	130	XYM	Stella Shipping Co., Ltd.	300, 800	P G	X	0.40
Ardayne ¹	140	YND	G. Heyn & Sons	300, 800	P G	X	0.40
Arensburg ¹	—	GBFQ	Donaldson Line, Ltd.	300, 800	P G	X	0.40
Argalia ¹	—	XLH	Anglo-Saxon Petro. Co., Ltd.	300, 800	P G	X	0.40
Argonauta ¹	150	YAA	Scottish Shire Line, Ltd.	300, 450, 800	P G	X	0.40
Argyllshire ²	220	GTJ	Alexander Shipping Co., Ltd.	300, 800	P G		0.40
Ariadne Alexandra ¹	—	LUA	Ariadne S.S. Co., Ltd.	300, 800	P G	X	0.40
Ariadne Christine ¹	130	EUT	Ariadne S.S. Co., Ltd.	300, 800	P G	X	0.40
Ariadne Irene ¹	130	EUS	Gulf Line, Ltd.	300, 800	P G	X	0.40
Ariano ¹	—	YFG	Ellerman's Wilson Line, Ltd.	300, 800	P G		0.40
Ariosto ¹	—	ZJB	Royal Mail Steam Packet Co.	300, 800	P G	N	0.40
Arlanza ¹	280	GCQV	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	N	0.40
Armadale Castle ¹	240	MOG	Union S.S. of New Zealand, Ltd.	300, 800	P G	N	0.40
Armagh ¹	200	BMZ	Care & Marquand Shipping Co.	300, 800	P G	X	0.40
Arncliffe ¹	150	GXX	Pyman Bell & Co., Ltd.	300, 800	P G	X	0.40
Aro ¹	130	YDG	British India S.N. Co., Ltd.	300, 800	P G	X	0.40
Arona ¹	220	MAZ	British & Burmese S.N. Co., Ltd.	300, 450, 800	P G		0.40
Arracan ¹	180	GWO	Moor Line, Ltd.	300, 800	P G		0.40
Arranmoor ¹	140	YID	Rankin, Gilmour & Co.	300, 800	P G	X	0.40
Artemisia ¹	—	GBDC	London, Brighton & S. Coast Railway	300, 800	P G	N	0.15 ¹⁰
Arundel ¹	135	MDZ	Union-Castle Mail S.S. Co.	300, 800	P G	N	0.40
Arundel Castle ¹	—	GCZL	Roberts Brining & Co.	300, 800	P G	X	0.40
Arwyco ¹	150	GCLO	Royal Mail Steam Packet Co.	300, 800	P G	X	0.40
Azilia ¹	150	GCOW	Ocean S.S. Co.	300, 800	P G	X	0.40
Ascanius ¹	200	MFV	Rankin, Gilmour & Co.	300, 800	P G	X	0.40
Aschenburg ¹	—	GBDY	British S.S. Co., Ltd.	300, 800	P G	X	0.40
Ascot ¹	135	NKZ	—	300, 800	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Asgard ¹	GBZV	—	E. T. Radcliffe & Co., Ltd.	300, 600	P G	X	0.40	—	
Ashanti ¹	ESK	160	Elder Line, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Ashpark ¹	GCMQ	—	J. & J. Denholm, Ltd.	300, 600	P G	X	0.40	—	
Ashtabula ¹	GKC	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—	
Ashwin ¹	ZQX	150	Ashwin & Co.	300, 600	P G	X	0.40	—	
Asian ¹	MKL	200	F. Leyland & Co., Ltd.	300, 600	P G	X	0.40	—	
Asiatic ¹	GUX	130	Stella S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Aspenleaf ¹	EQF	—	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Assaye ¹	MOO	155	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Assaye ¹	MOO	155	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Assout ¹	ERL	150	Moss S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Astraea ¹	MOX	144	Cardiff S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Astrakhan YBG ¹	YBG	—	Astrakhan S.S. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Astronomer ¹	LUY	160	Charente S.S. Co., Ltd.	600	P G	X	0.40	—	
Asturian ¹	EMG	150	Ellerman's Lines, Ltd.	300, 600	P G	X	0.40	—	
Asturias ¹	MBB	250	Glover Bros.	300, 600	P G	X	0.40	—	
Asyanax ¹	ZKF	150	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Asuncion de Larrinaga ¹	EMB	150	Miguel de Larrinaga, S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Athensic MWN ¹	MWN	200	Oceanic S.N. Co.	300, 600	P G	X	0.40	—	
Athensic ZUL ¹	ZUL	150	Anglo-Belgique Shipping Co.	300, 600	P G	X	0.40	—	
Atoll ¹	EVY	170	J. Warrack and Co.	300, 600	P G	X	0.40	—	
Atlantien ¹	XMR	—	Elder Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	
Atlantic YLJ ¹	YLJ	125	St. Just S.S. Co.	300, 600	P G	X	0.40	—	
Atlantis ¹	ELC	180	Atlantic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Atto ¹	GBLQ	—	Houlder, Middleton & Co., Ltd.	300, 600	P G	X	0.40	—	
Augberg ¹	GBLQ	—	Watts, Watts & Co.	300, 600	P G	X	0.40	—	
August Belmont	GBZK	130	Burdick & Cook, Inc.	300, 600	P G	X	0.40	—	
Auguste Halenbois ¹	GBZK	130	Burdick & Cook, Inc.	300, 600	P G	X	0.40	—	
Augustine ¹	GBZK	130	Burdick & Cook, Inc.	300, 600	P G	X	0.40	—	
Augustine ¹	GBZK	130	Burdick & Cook, Inc.	300, 600	P G	X	0.40	—	

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Bayford ¹	BEL	185	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baygola ¹	ZXW	170	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baygowan ¹	ZYV	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayhowel ¹	LWU	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayleaf ¹	EZH	185	British Tanker Co., Ltd.	300, 600	P G	X	0.40
Baylula ¹	BAF	170	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baymano ¹	YHX	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baymanter ¹	BAD	170	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baymingo ¹	YHP	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayramento ¹	YCW	—	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayronto ¹	ZCX	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baysarria ¹	VNW	155	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baysarua ¹	EQO	160	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Baytighen ¹	ESP	185	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayusona ¹	BEV	130	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Bayverdun ¹	ZXX	170	The Bay S.S. Co., Ltd.	300, 600	P G	X	0.40
Beacon Grange ¹	GCQL	185	Houlder Line, Ltd.	300, 600	P G	X	0.40
Beaverton	XTO	—	Canada S.S. Lines, Ltd.	300, 600	P G	X	0.40
Bechuana ¹	ZPS	—	Ellerman & Bucknall S.S. Co., Ltd.	300, 600	P G	X	0.40
Beckenham ¹	EWU	—	British S.S. Co., Ltd.	300, 600	P G	X	0.40
Beechleaf ¹	EGZ	185	Anglo-Saxon. Pet. Co., Ltd.	300, 600	P G	X	0.40
Beechpark ¹	ECBR	—	I. & J. Denholm	300, 600	P G	X	0.40
Beechwood ¹	YAE	185	Beechwood S.S. Co., Ltd.	300, 600	P G	X	0.40
Belgian ¹	CXNM	200	Leyland Line	300, 600	P G	X	0.40
Belgic ¹	ZXC	200	International Nav. Co., Ltd.	300, 600	P G	X	0.40
Beldina ¹	XXE	—	Adelaide S.S. Co.	300, 600	P G	X	0.40
Belgravian ¹	OEK	130	Ellerman Lines, Ltd.	300, 600	P G	X	0.40
Belize ¹	BEQ	120	Royal Mail Steam Packet Co.	300, 600	P G	X	0.40
Bellerby ¹	ESY	130	Sir R. Kropner & Co.	300, 600	P G	X	0.40
Bellerophon ¹	GTD	120	Ocean S.S. Co., Ltd.	300, 600	P G	X	0.40
Belfield ¹	YDZ	135	Keighley Shipping Co., Ltd.	300, 600	P G	X	0.40
Belltown ¹	ZCD	135	Keighley Shipping Co., Ltd.	300, 600	P G	X	0.40
Bellview	GCDM	—	J. Bell & Co.	300, 600	P G	X	0.40
Beltana ¹	MKR	175	P. & O. Steam N. Co.	300, 600	P G	X	0.40
Bembridge ¹	YKX	150	J. Temperley	300, 600	P	X	0.40
Bempton ¹	MHS	135	Hull Steam Fishing & Ice Co., Ltd.	300, 600	P	X	0.40
Bemalder ¹	ENS	200	Wm. Thomson & Co.	300, 600	P G	X	0.40
Benalla ¹	GBI	220	P. & O. S.N. Co.	300, 600	P G	X	0.40
Benarty ¹	VLT	220	W. Thomson & Co.	300, 600	P G	X	0.40
Benavon ¹	EJD	200	W. Thomson & Co.	300, 600	P G	X	0.40
Bendeuch ¹	ZZA	200	W. Thomson & Co.	300, 600	P G	X	0.40
Bendoran ¹	YEM	200	W. Thomson & Co.	300, 600	P G	X	0.40
Bendu ¹	ZME	185	Elder Line...	300, 600	P G	X	0.40
Benedict ¹	ZKY	170	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40
Benefactor ¹	MOE	185	Charente S.S. Co.	300, 600	P G	X	0.40
Benguela ¹	ZMQ	—	Imperial Direct Line, Ltd.	300, 600	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Franks.	Franks	
Benin ¹ ..	ZMR	170	Imperial Direct Line, Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Benlawers ¹	YJS	200	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Benledi ¹	YJU	200	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Benlomo ¹	LTC	200	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Ben noir ¹	BDO	135	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Ben Nevis ¹	GYX	130	Watson Bros.	300, 600	P G ..	X	0.40	—	
Benrines ¹	EKC	200	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Benue ¹	ZMF	155	African S.S. Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Benvenue ¹	EPQ	185	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Ben Vollich ¹	GCFB	—	W. Thomson & Co.	300, 600	P G ..	X	0.40	—	
Benwood ¹	VCA	155	London American Trading Co.	300, 600	P G ..	X	0.40	—	
Berbec ¹	GIF	155	Royal Mail Steam Packet Co.	300, 600	P G ..	X	0.40	—	
Berby ¹	YDC	170	Elder Dempster & Co.	300, 600	P G ..	X	0.40	—	
Berlin ¹	GCRM	—	P. & O. S.N. Co.	300, 600	P G ..	X	0.40	—	
Bermida ¹	GHDJ	—	Lawther, Latta & Co.	300, 600	P G ..	X	0.40	—	
Bernini ¹	XFE	150	Lampart & Holt, Ltd.	300, 600	P G ..	X	0.40	—	
Berriedale ¹	LUI	170	Albana S.S. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Berrima ¹	YWR	220	P. & O. S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Berwick Castle ¹	GCQN	200	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Berwindmoor ¹	GCQP	155	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Berwindvale ¹	GCQX	155	Berwindvale S.S. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Betwa ¹	BDZ	190	James Nourse, Ltd.	300, 600	P G ..	X	0.40	—	
Bhamo ²	GWA	125	Burmah S.S. Co., Ltd.	300, 600	P G ..	1000 to 1200 1600 to 1800 2000 to 2400	0.40	—	
Bharata	GAD	200	British India S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Biafra ¹	YCF	180	Elder Dempster & Co., Ltd.	300, 600	P G ..	X	0.40	—	
Biarritz ¹	EZN	—	S.E. & Chatham Rly. Co.	300, 600	P G ..	—	0.40	—	
Rideford ¹	BOA	145	North Wales Shipping Co. Ltd.	300, 600	P G ..	X	0.40	—	
Biela ¹	YNC	140	Lampart & Holt, Ltd.	300, 600	P G ..	X	0.40	—	
Bilster ¹	BUC	145	Canada S.S. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Binefield ¹	GBMV	170	British India S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Frans.	Frans.	
Braunfels ¹	BPG	—	Grahams & Co.	300, 600	P G	X	0.40	—	
Brazilier ¹	OET	150	Lloyd Royal Belge (Great Britain) Ltd.	300, 600	P G	X	0.40	—	
Breconian ¹	YEW	120	Tyneside Line, Ltd.	300, 600	P G	X	0.40	—	
Bremen ¹	GBJK	—	P. & O. S.N. Co.	300, 600	P G	X	0.40	—	
Brendon ¹	BEK	135	Medit. Cargo Steamers, Ltd.	300, 600	P G	X	0.40	—	
Brescia ESS ¹	ESS	165	Cunard S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Bretanier ¹	EXP	140	Lloyd Royal Belge (Great Britain) Ltd.	300, 600	P G	X	0.40	—	
Bretwalda ¹	GBJR	170	Hall Bros. S.S. Co.	300, 600	P G	X	0.40	—	
Breynton ¹	LSZ	145	Globe Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Briarleaf ¹	EYA	200	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Brighton BNF ¹	BNF	140	I. Constantine & Son	300, 600	P G	X	0.40	—	
Brighton MOV ¹	MOV	130	R. Chapman & Son	300, 600	P G	X	0.40	—	
Brinkburn ¹	BQO	95	L.B. & S.C.R. Co.	300, 600	P G	N	0.15 ¹⁸	1.50 ¹⁸	
Britannia GCRB ³	GCRB	145	Anglo-Belgique Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
British Admiral ¹	ZYY	170	Eastern Telegraph Co.	300, 450, 600	P	X	0.40	—	
British Baron ¹	EYU	200	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Beacon ¹	BOU	155	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
British Duke ¹	EYS	170	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Earl ¹	EYL	140	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
British Emperor ¹	ZLK	175	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Empress ¹	ZY2	160	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Ensign ¹	ZYV	150	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British General ¹	YJE	—	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Isles ¹	ZYW	150	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
British Knight ¹	EYN	130	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Lantern ¹	BON	140	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Light ¹	BOD	120	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Major ¹	BLN	160	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Marquis ¹	EYW	150	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
British Marshall ¹	VII	—	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Peer ¹	EYM	150	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
British Princess ¹	ZVT	180	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Sovereign ¹	ZYU	150	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Star ¹	BOI	150	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
British Transport ¹	ZDT	145	Empire Transport Co., Ltd.	300, 600	P G	X	0.40	—	
British Viscount ¹	EYT	190	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	—	

Briton ¹	MOJ	250	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	N	0.40
Broadmayne ¹	EXX	140	Associated Oil Carriers, Ltd.	300, 600	P G	..	X	0.40
Brodholme ¹	YVR	170	Brodholme S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Brodhurst ¹	YSC	160	Brodhurst S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Brodlea ¹	YVY	220	Brodlea S.S. Co., Ltd.	300, 450, 600	P G	..	X	0.40
Brodline ¹	YVS	220	Brodline S.S. Co., Ltd.	300, 450, 600	P G	..	X	0.40
Brodmead ¹	MRO	250	Blue Star Line, Ltd.	300, 600	P G	..	X	0.40
Brodmont ¹	MVP	190	Blue Star Line, Ltd.	300, 600	P G	..	X	0.40
Brodworth ¹	ESE	140	R. S. Dalgleish, Ltd.	300, 600	P G	..	X	0.40
Brodvale ¹	MRB	230	Brodvale S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Bronte GCPZ ¹	GCPZ	—	Lampport & Holt, Ltd.	300, 600	P G	..	X	0.40
Brookvale ¹	BRB	—	Rhonda Shipping & Coal Exporting Co.	300, 600	P G	..	X	0.40
Broompark ¹	YTH	135	Dennholm Line	300, 600	P G	..	X	0.40
Browning ¹	GGBL	—	Lampport & Holt, Ltd.	300, 600	P G	..	X	0.40
Bruyere ¹	GGBM	165	Lampport & Holt, Ltd.	300, 600	P G	..	X	0.40
Bryntawe ¹	BSR	140	H. & E. Goldberg	300, 600	P G	..	X	0.40
Buckleigh ¹	BDY	160	Medit. Cargo Steamers, Ltd.	300, 600	P G	..	X	0.40
Bulimba ¹	XGG	170	British India S.N. Co., Ltd.	300, 600	P G	..	X	0.40
Buranda ¹	LSY	145	Buranda S.S. Co.	300, 600	P G	..	X	0.40
Burdale ¹	XFM	120	Burdale S.S. Co.	300, 600	P G	..	X	0.40
Burgemeister	GBCS	—	Bell Bros. & Co.	—	P G	..	X	0.40
Schroder ¹	OEZ	—	Lloyd Royal Belge (Great Britain) Ltd.	300, 600	P G	..	X	0.40
Burgondler ¹	BDM	170	D. MacIver, Sons & Co., Ltd.	300, 600	P G	..	X	0.40
Burgundy ¹	GVT	140	Burma S.S. Co., Ltd.	300, 450, 600	P G	..	1000 to 1200 1400 to 1600 2000 to 2400	0.40
Burma ¹	—	—	—	—	—	—	—	—
Burnese Prince ¹	GRP	200	Prince Line, Ltd.	300, 600	P G	..	N	0.40
Burnholme ¹	ELV	—	Rowland & Marwoods S.S. Co.	300, 600	P G	..	X	0.40
Burnhope ¹	GXQ	—	Burnett S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Bury ¹	ODK	—	Great Central Railway	300, 600	P G	..	X	0.40
Butetown ¹	BBH	—	Town Line	300, 600	P G	..	X	0.40
Byron ¹	GBH	250	Leapool, Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	..	N	0.40
Cabotia ¹	YTH	180	Anchor Donaldson Line	300, 600	P G	..	X	0.40
Cadillac ¹	EYF	160	Anglo-American Oil Co., Ltd.	300, 600	P G	..	X	0.40
Caesarea ¹	MSZ	250	L. & S.W. R. Co.	300, 600	P G	..	N	0.40
Cairdhu ¹	YVO	180	Cairns, Noble & Co., Ltd.	300, 600	P G	..	X	0.40
Cairngowan ¹	EWZ	170	Cairn Line of Steamships, Ltd.	300, 600	P G	..	X	0.40
Cairmona ¹	ZFC	155	Cairn Line of Steamships, Ltd.	300, 600	P G	..	X	0.40
Cairnvalona ¹	XJK	155	Cairn Line of Steamships, Ltd.	300, 600	P G	..	X	0.40
Calthness ¹	YCX	—	Sutherland S.S. Co.	300, 600	P G	..	X	0.40
Calabria MAJ ¹	MAJ	200	Henderson Bros.	300, 600	P G	..	N	0.40
Calcutta GCRZ ¹	GCRZ	—	Anglo-American Oil Co.	300, 600	P G	..	X	0.40
Caledon ¹	GBWZ	110	MacAndrews & Co.	300, 600	P G	..	X	0.40
Caledonia ¹	MNU	230	P. & O. S.N. Co., Ltd.	300, 600	P G	..	X	0.40
Caledonian ¹	MDT	150	F. Leyland & Co., Ltd.	300, 600	P G	..	X	0.40
Calonne ¹	ZPI	150	Equinox S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Caloric YRP ¹	YRP	150	Bank, Line, Ltd.	300, 600	P G	..	X	0.40
Camana ¹	ZXQ	120	Blue Star Line, Ltd.	300, 600	P G	..	X	0.40

Cardigan ¹	BCQ	170	Cardigan S.S. Co., ..	300, 600	P G	..	X	0.40
Cardiganshire ¹	MAU	200	Royal Mail Steam Packet Co.,	300, 600	P G	..	N	0.40
Cardynn ¹	MZB	200	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	..	X	0.40
Carib Prince ¹	ZBU	150	Prince Line, Ltd. ..	300, 600	P G	..	0600 to 0800	0.40
							0900 to 1200	
							1400 to 1800	
							2000 to 2200	
Carlsbrook ¹	EKF	—	Red Cap S.S. Co. Ltd.	300, 600	P G	..	X	0.40
Carlsbrook Castle ¹	MOW	200	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	N	0.40
Carlou Castle ¹	YDB	165	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Carmania ¹	MAA	200	Cunard S.S. Co., Ltd.	300, 600	P G	..	N	0.40
Carmanthenshire ¹	MUS	220	Royal Mail Steam Packet Co.,	300, 600	P G	..	N	0.40
Carnarvonshire ¹	MZR	220	Royal Mail Steam Packet Co.,	300, 600	P G	..	N	0.40
Carolus ¹	GDBL	125	Ohlson S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Caronia ¹	MKA	350	Cunard S.S. Co., Ltd.	300, 600	P G	..	N	0.40
Carpentaria ¹	MHG	100	British India Steam N. Co., Ltd.	300, 600	P G	..	X	0.40
Carperby ¹	BTS	120	Sir R. Ropner & Co. Ltd.	300, 600	P G	..	X	0.40
Carriagan Head ¹	ZKT	150	Ulster S.S. Co., Ltd.	300, 600	P G	..	X	0.40
							0600 to 0800	
							0900 to 1200	
							1400 to 1800	
							2000 to 2200	
Carron ¹	LSP	—	Carron Co., ..	300, 600	P G	—	X	—
Carton ¹	GXY	150	Bathampton S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Carventum ¹	CIX	—	Ronne S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Cassandra ¹	MBD	200	Donaldson Line, Ltd.	300, 600	P G	..	N	0.40
Cassel ¹	GBYZ	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	..	X	0.40
Cassisi ¹	MFO	160	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	..	X	0.40
Castalia MWZ ¹	MWZ	180	Anchor Line, Ltd.	300, 600	P G	..	X	0.40
Castellano ¹	KKZ	150	Gulf Line, Ltd.	—	P G	—	X	—
Castilian ¹	GBVX	—	Moor Line, Ltd.	300, 600	P G	..	X	0.40
Castlemoor ¹	YIE	145	Royal Mail Steam Packet Co.,	300, 600	P G	..	X	0.40
Catalina ZHL ¹	ZHL	210	Gulf Line, Ltd.	300, 600	P G	..	0600 to 0800	0.40
Caterino ¹	ZFI	170		300, 600	P G	..	0900 to 1200	0.40
							1400 to 1800	0.40
							2000 to 2200	0.40
Cauca ¹	GVZ	140	Pacific S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Cavour ¹	YOR	200	Liverpool, Brazil and River Plate S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Cawdor Castle	GCRF	170	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Cedar Branch ¹	YMP	170	Nautilus S.S. Co., Ltd.	300, 600	P G	..	X	0.40
Cedric ¹	MDC	250	Oceanic S. N. Co., Ltd.	300, 600	P G	..	N	0.40
Celtia ¹	ZOO	—	Harley & Miller, Ltd.	300, 600	P G	..	X	0.40
Celtic ¹	MIC	250	Oceanic S. N. Co., Ltd.	300, 600	P G	..	N	0.40
Celtic Prince ¹	XIX	120	Prince Line, Ltd.	300, 600	P G	..	0600 to 0800	0.40
							0900 to 1200	0.40
							1400 to 1800	0.40
							2000 to 2200	0.40
Centro ¹	GVR	145	Corinthian S. Co., Ltd.	300, 600	P G	..	X	0.40
Central No. 1	BBI	—	Great Central Railway	300, 600	P G	..	X	0.40
Ceramic ¹	MCP	250	Oceanic S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Cervantes ¹	GBXC	140	MacAndrews & Co., Ltd.	300, 600	P G	..	X	0.40
Chakdara ¹	MUO	180	British India S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Chakdina ¹	MZY	180	British India S. N. Co., Ltd.	300, 600	P G	..	X	0.40
Chakla ¹	MWQ	180	British India S. N. Co., Ltd.	300, 600	P G	..	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal) Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum Per Radio-telegram.	
UNITED KINGDOM—cont'd.							Francs.	Francs.	
Chakrata ¹	GPE	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Chaleur ¹	GMN	220	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Challister ¹	ESF	170	Anglo-Newfoundland Div. Co., Ltd.	300, 600	P G	X	0.40	—	
Chama ¹	ZLZ	190	African S.S. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Chanda ¹	GPT	180	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Changunloa ¹	MPM	200	Elders & Fyffes, Ltd.	300, 600	P G	X	0.40	—	
Chatham ¹	ZSH	—	Britain S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Chaudiere ¹	GDK	180	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Chelston ¹	ZRO	130	Waverley S.S. Co., Ltd.	300, 600	P G	X	—	—	
Chemnitz ¹	GBCJ	—	G. Thompson & Co., Ltd.	300, 600	P G	X	0.40	—	
Chenab ¹	GWK	115	James Nourse, Ltd.	300, 600	P G	X	0.40	—	
Cheniston ¹	OCH	140	Brantingham S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Chepstow Castle ¹	ZAN	150	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Cherry Branch ¹	YYZ	160	F. & W. Ritson	300, 600	P G	X	0.40	—	
Cherryleaf ¹	ZZN	220	Lane & Macandrew, Ltd.	300, 600	P G	X	0.40	—	
Chertsey ¹	YDM	200	Britain S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Cheyenne ¹	GCRK	145	Anglo-American Oil Co.	300, 600	P G	X	0.40	—	
Chicago City ¹	BOX	150	C. Hills & Sons	300, 600	P G	X	0.40	—	
Chignecto ¹	MBV	220	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Chile GCRL ¹	GCRL	220	Pacific S.N. Co., Ltd.	300, 600	P G	N	0.40	—	
Chilier ¹	BUQ	—	Lloyd Royal Belge (Great Britain), Ltd.	300, 600	P G	X	0.40	—	
Chimu ¹	BCA	—	New York & Pacific S.S. Co.	300, 600	P G	X	0.40	—	
China ¹	MMU	250	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Chindwara ¹	GAR	170	British India S.N. Co., Ltd.	300, 600	P G	1000 to 1200 1600 to 1800 2000 to 2400	0.40	—	
Chindwin ¹	GWG	180	Burmah S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Chinese Prince ¹	YJD	—	Prince Line, Ltd.	300, 600	P G	X	0.40	—	
Chingford ¹	YGI	115	Fernlands S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Chinkoa ¹	MKO	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Chipana ¹	ZIE	—	New York & Pacific S.S. Co., Ltd.	300, 600	P G	X	—	—	
Chiria ¹	GUV	30	James Bird, London	300, 600	P G	X	—	—	
Chiswick ¹	BNX	140	Britain S.S. Co., Ltd.	300, 600	P G	X	0.40	—	

Ship	YYP	145	Guérét's Anglo-Brazilian Co., Ltd.	Coaling	300, 600	P G	X	0.40
Chilverstone ¹	..	145	Guérét's Anglo-Brazilian Co., Ltd.	Coaling	300, 600	P G	X	0.40
Chaybessa ¹	..	170	British India S.N. Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	British India S.N. Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	150	John Hall, jun.	..	300, 600	P G	X	0.40
Cad ¹	..	135	Hall Bros. S.S. Co.	..	300, 600	P G	X	0.40
Cad ¹	..	140	Lloyd Royal Belge (Gt. Britain) Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	100	Henderson Bros. (Anchor Line)	..	300, 600	P G	X	0.40
Cad ¹	..	185	Anglo Saxon Petro. Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	—	MacAndrews & Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	150	Bede S.S. Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	175	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	—	Transport & Trading Co.	..	300, 600	P G	X	0.40
Cad ¹	..	170	Hall Line, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	220	Midland Railway Co.	..	300, 600	P G	X	0.40
Cad ¹	..	250	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	135	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	160	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	—	Great Central Ry.	..	300, 600	P G	X	0.40
Cad ¹	..	150	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	200	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	150	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	135	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	130	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	130	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	160	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	190	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	145	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	200	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	200	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	—	Hall Line, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	150	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	140	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	160	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	170	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	170	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	250	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	170	Hall Line, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	150	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	170	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	170	City of Oran S.S. Co.	..	300, 600	P G	X	0.40
Cad ¹	..	—	Ellerman & Bucknall S.S. Co.	..	300, 600	P G	X	0.40
Cad ¹	..	230	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	160	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	—	Olivier & Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	Hall Line, Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	155	Transport & Trading Co., Ltd.	..	300, 600	P G	X	0.40
Cad ¹	..	180	Ellerman Lines, Ltd.	..	300, 600	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
City of Versailles ¹ ..	YNO	—	Transport & Trading Co., Ltd. ..	300, 600	P G ..	X	0.40	—	
City of Vienna ¹ ..	MSK	160	Ellerman Lines, Ltd. ..	300, 600	P G ..	X	0.40	—	
City of Winchester ¹ ..	LUC	135	Ellerman Lines, Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
City of York ¹ ..	GAO	250	Ellerman Lines, Ltd. ..	300, 600	P G ..	X	0.40	—	
Clam ¹ ..	YH/Z	130	Anglo Saxon Petro. Co., Ltd. ..	300, 600	P G ..	X	0.40	—	
Clan Alpine ¹ ..	XJE	140	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Buchanan ¹ ..	YVZ	145	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Chattan ¹ ..	ZHS	135	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Chisholm ¹ ..	LSF	125	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Colquhoun ¹ ..	YZA	145	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Cumming ¹ ..	YOH	150	Cayzer, Irvine & Co., Ltd. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Graham	YUL	190	Glover Bros. ..	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	

Clan Kennedy ¹	..	EQI	150	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Kenneth ¹	..	YES	—	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Lamont ¹ ..	..	YON	200	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Lindsay ¹	..	YOO	120	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan MacArthur ¹	..	YZS	170	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macaulay ¹	..	YJQ	125	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macbean ..	..	XJD	120	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macbeolan ¹	..	YGF	155	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macbeth ¹	..	YVV	200	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macbrayne ¹	..	YPS	160	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macbride ¹	..	ZHT	150	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macdonald ¹	..	ZHV	145	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Clan Macewen ²	..	GVH	100	Cayzer, Irvine & Co., Ltd.	..	300, 600	P G	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							France.	France.	
Clan Macfadyen ¹ ..	LSG	130	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Macgillivray ² ..	GVS	100	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Macinnes ¹ ..	GCTP	—	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	—	—	
Clan Macintosh ¹ ..	ZGE	150	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Macintyre ¹ ..	MOC	—	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan MacKay ..	YTI	—	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan MacKellar ² ..	GZM	100	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Mackenzie ¹ ..	YXX	180	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Mackinlay ¹ ..	YXC	135	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Mackinnon ¹ ..	YOG	145	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Maclaren ¹ ..	YJO	—	Cayzer, Irvine & Co., Ltd.	300, 600	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	

Company	Share	Capital	Reserves	Profit	Dividend	Notes
Clan Maclean ¹	100	100	100	100	100	100
Clan Macmaster ¹	100	100	100	100	100	100
Clan Macmillan ¹	100	100	100	100	100	100
Clan Macphie ¹	100	100	100	100	100	100
Clan Macquarrie ²	100	100	100	100	100	100
Clan Macrae ³	100	100	100	100	100	100
Clan Macvicar ¹	100	100	100	100	100	100
Clan Macwilliam ¹	100	100	100	100	100	100
Clan Malcolm ¹	100	100	100	100	100	100
Clan Matheson ¹	100	100	100	100	100	100
Clan Menzies ¹	100	100	100	100	100	100
Clan Mounroe ¹	100	100	100	100	100	100
Clan Morrison ¹	100	100	100	100	100	100
Clan Murdoch ¹	100	100	100	100	100	100

• Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Clan Murray ¹ ..	LSR	110	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Ogilvy ² ..	GVV	100	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Ranald ¹ ..	EIT	140	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Robertson ¹ ..	ZHU	130	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Ross ² ..	GVU	100	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Sinclair ¹ ..	YZB	130	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Skene ¹ ..	BUK	100	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Stuart ¹ ..	ZPN	145	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Clan Sutherland ¹ ..	YJP	120	Cayzer, Irvine & Co., Ltd.	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	

Clan Urquhart ¹	YZG	190	Cayzer, Irvine & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40
Clare Hugo Stinnes I ¹	GBCZ	—	Bell, Symondson & Co.	300, 600	P G	—	—
Clarissa Radcliffe ¹	EWFF	190	Clarissa Radcliffe S.S. Co.	300, 600	P G	—	0.40
Claro ¹	ODV	120	Ellerman's Wilson Line, Ltd.	300, 600	P G	—	0.40
Classic ¹	ZCF	—	Belfast S.S. Co. Ltd.	300, 600	P G	—	0.05 ²⁰
Claus Horn ¹	GCTK	—	Harris & Dixon, Ltd.	300, 600	P G	—	0.40
Claymont ¹	BAH	—	Scarisbrick S.S. Co., Ltd.	300, 600	P G	—	0.40
Clayton ¹	GCTF	—	Scarisbrick S.S. Co., Ltd.	300, 600	P G	—	0.40
Cleapool ¹	LTI	130	Pool Shipping Co., Ltd.	300, 600	P G	—	0.40
Cleaton ¹	YGI	125	R. Chapman & Son	300, 600	P G	—	0.40
Cleaway ¹	MYH	210	Anglo-Oriental Nav. Co., Ltd.	300, 600	P G	—	0.40
Clematis ¹	EOB	—	Leeston Shipping Co., Ltd.	300, 600	P G	—	0.40
Clemenceau ¹	ZRH	120	London Transport Co., Ltd.	300, 600	P G	—	0.40
Cliffower ¹	YMA	145	Hansen Shipping Co., Ltd.	300, 600	P G	—	0.40
Cliftonhall ¹	EKV	110	Dunstable S.S. Co., Ltd.	300, 600	P G	—	0.40
Clintonia ¹	VHT	145	Slag Line, Ltd.	300, 600	P G	—	0.40
Cloutcham ¹	ZIS	—	Taten S.N. Co., Ltd.	300, 600	P G	—	0.40
Cloutham ¹	GXW	140	W. Hartlepool S.N. Co., Ltd.	300, 600	P G	—	0.40
Clun Castle ¹	GCRN	200	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	—	0.40
Clutha ¹	YVD	—	W. Roberts	300, 600	P G	—	0.40
Clydesdale ¹	BDF	180	Wearmouth S.S. Co., Ltd.	300, 600	P G	—	0.40
Coatsworth ¹	GDCB	175	Robert Stanley Shipping Co., Ltd.	300, 600	P G	—	0.40
Coconada ¹	GCRP	210	British India S.N. Co., Ltd.	300, 600	P G	—	0.40
Colaba ¹	GBT	175	British India S.N. Co., Ltd.	300, 600	P G	—	0.40
Colleen Bawn ¹	YWM	110	Lan. & Yorks. Rly. Co.	300, 600	P G	—	0.40
Collingham ¹	EJZ	—	Pentwyn S.S. Co., Ltd.	300, 600	P G	—	0.40
Colon ¹	GCKD	120	MacAndrews & Co., Ltd.	300, 600	P G	—	0.40
Colonia BBS ¹	BBS	—	Shipping Controller	300, 600	P G	—	0.40
Colonia MCL ¹	MCL	140	Telegraph Construction & Maintenance Co., Ltd.	300, 600	P	—	—
Columbia ¹	YSY	170	Charente S.S. Co., Ltd.	300, 600	P G	—	0.40
Columbia MOI ¹	MOI	230	Henderson Bros. (Anchor Line)	300, 600	P G	—	0.40
Comanche ¹	GCRQ	140	Anglo-American Oil Co., Ltd.	300, 600	P G	—	0.40
Comeric ¹	GRTD	160	Bank Line Ltd.	300, 600	P G	—	0.40
Comie ¹	LSK	110	Belfast S.S. Co., Ltd.	300, 600	P G	—	0.05 ²⁰
Comino ¹	RTD	—	Gulf Line, Ltd.	300, 600	P G	—	0.40
Commonwealth ¹	GCRS	170	P. & O. S.N. Co., Ltd.	300, 600	P G	—	0.40
Competition ¹	FQJ	135	Leeston Shipping Co., Ltd.	300, 600	P G	—	0.40
Comrie Castle ¹	GCRT	200	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	—	0.40
Concordia ¹	ELI	190	Donaldson Line, Ltd.	300, 600	P G	—	0.40
Confield ¹	XEJ	120	Confined S.S. Co., Ltd.	300, 600	P G	—	0.40
Conway ¹	GID	150	Duke of Manchester	300, 600	P G	—	0.40
Conway ¹	ZHM	180	Royal Mail S.P. Co., Ltd.	300, 600	P G	—	0.40
Cooeyanna ¹	GBV	170	British India S.N. Co., Ltd.	300, 600	P G	—	0.40
Copenhagen ¹	ENS	140	Glasgow Shipowners Co.	300, 600	P G	—	0.40
Cog EYO (Le) ¹ (see Le Coq)	—	—	—	—	—	—	—
Coquetmede ¹	BDE	—	D. & T. G. Adams	300, 600	P G	—	0.40
Corby ¹	BDD	145	Corinthian S.S. Co., Ltd.	300, 600	P G	—	0.40
Corcovado MIE ¹	MIE	210	Pacific S.N. Co.	300, 600	P G	—	0.40
Corcrest ¹	BBV	130	Cory Colliers, Ltd.	300, 600	P G	—	0.05

Ship Stations—Continued

[illegible]

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Darro ¹	GCVR	260	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Datchet ¹	EWB	140	British S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
David Lloyd George ¹	EOS	200	Williams & Mordey	300, 600	P G	X	0.40	—	
Daybeam	GCYP	—	Claymore Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Daybreak	GCYQ	—	Claymore Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Dean Swift ¹	EIV	—	General S.N. Co., Ltd.	300, 600	P G	X	—	—	
Dee ¹	XJF	150	J. Hall, Jr., & Co., Ltd.	300, 600	P G	X	0.40	—	
Deerwood ¹	XIK	120	W. France, Fenwick & Co., Ltd.	300, 600	P G	X	0.40	—	
Defender ¹	YTE	230	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Delambre ¹	BHC	190	Lampoirt & Holt	300, 600	P G	X	0.40	—	
Delaware	GCWR	200	Anglo-American Oil Co., Ltd.	300, 600	P G	X	0.40	—	
Delmira ¹	ZVS	140	Kyle Transport Co., Ltd.	300, 600	P G	X	0.40	—	
Delphinula ¹	MXR	170	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Delta GBIT ¹	GBIT	145	J. & A. Roxburgh	300, 600	P G	X	0.40	—	
Delta MKG ¹	MKG	240	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Demerata ¹	GCZR	230	Royal Mail Steam Packet Co.	300, 600	P G	X	0.40	—	
Demodocus ¹	ZKH	180	A. Holt & Co.	300, 600	P G	X	0.40	—	
Demosthenes ¹	MKG	230	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Denis ¹	MDE	170	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Derbyshire ¹	XJA	140	Denholm Line Steamers	300, 600	P G	X	0.40	—	
Derindje ¹	MYB	200	Bibby S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Derwent River ¹	GBKC	—	Hall Bros.	300, 600	P G	X	0.40	—	
Desado ¹	ZEF	170	British Empire S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Desa ¹	GCRR	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Dessau ¹	GBNR	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	
Deucalion ¹	YOW	210	Gow, Harrison & Co.	300, 600	P G	X	0.40	—	
Devanha ¹	MOU	180	Ocean S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Devon ¹	ZBJ	180	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
			Federal S.N. Co., Ltd.	300, 600	P G	0800 to 1200 1400 to 1500 1800 to 2400	0.40	—	
Devona ¹	GRD	150	Cairn Line of S.S.	300, 600	P G	X	0.40	—	
Devon City ¹	ESD	150	St. Just S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Dewsbury ¹	BEQ	—	Great Central Railway	300, 600	P G	X	—	—	
Dibble Bridge ¹	ZHJ	155	Swift S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Dictator ¹	BDH	170	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Dieppe ¹	MRL	90	L.R. & S.C. Railway Co.	300, 600	P G	N	0.15 ¹⁸ 0.15 ¹⁹	1.50 ¹⁹	

Digby ¹ ..	MNG	190	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40
Dilwara ¹	GCF	200	British India S.N. Co., Ltd.	300, 600	P G	X	0.40
Director ¹	ETB	180	Charante S.S. Co., Ltd.	300, 600	P G	X	0.40
Dirk ..	GBB	—	David Macbrayne, Ltd.	300, 600	P G	X	0.40
Discover ¹	EIF	170	Charante S.S. Co., Ltd.	300, 600	P G	X	0.40
Diyatalawa ¹	ESZ	—	Grahams & Co.	300, 600	P G	X	0.40
Djerissa ¹	GZC	100	H. E. Moss & Co., Ltd.	300, 600	P G	X	0.40
Knockleaf ¹	EZK	190	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40
Dogra ¹ ..	BBP	—	Asiatic S.N. Co., Ltd.	300, 600	P G	X	0.40
Dolaura ..	GCTJ	100	Arthur Meeker (Seattle) ..	300, 600	P	X	0.40
Dolphin Shell ¹ ..	ZEP	200	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40
Domingo de Larrinaga ¹	ZJC	170	Domingo de Larrinaga S.S. Co. ..	300, 600	P G	X	0.40
Dominic ¹	ZKO	180	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40
Dominion ¹	MDP	260	British & North Atlantic S.N. Co., Ltd.	300, 600	P G	X	0.40
Domira ¹	YJR	140	Preston S.N. Co., Ltd.	300, 600	P G	X	0.40
Donax ¹ ..	ZNL	185	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40
Don Cesar ¹ ..	EUQ	145	Buenos Ayres Gt. S. Riv. Co., Ltd.	300, 600	P G	X	0.40
Dongola ¹ ..	MNH	240	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40
Doonholm ¹	ZXM	130	Mitre Shipping Co., Ltd.	300, 600	P G	X	0.40
Dora ¹ ..	GBWJ	—	C. Doreas & Co.	300, 600	P G	X	0.40
Doria ¹ ..	LSX	150	Dorie S.S. Co., Ltd.	300, 600	P G	X	0.40
Dorington Court ¹	MWR	170	Cressington S.S. Co., Ltd.	300, 600	P G	X	0.40
Dorset ¹ ..	GRY	320	Potter, Trinder & Gwyn ..	300, 450, 600	P G	X	0.40
Dotterel ¹	ZRC	—	Cork S.S. Co., Ltd.	300, 600	P G	X	0.50 ²⁸
Douro ODI ¹ ..	ODJ	135	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40
Dromore Castle ¹	YAD	—	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40
Dryden ¹	ZHW	—	Stag Line, Ltd.	300, 600	P G	X	0.40
Duchess of Devonshire ¹	GPP	150	Midland Railway Co.	300, 400, 600	P G	X	0.40
Duendes ¹	GCSB	250	Pacific S.N. Co., Ltd.	300, 600	P G	X	0.40
Duffield ¹	ZQJ	150	Northern Petroleum Tank S.S. Co.	300, 600	P G	X	0.40
Duke of Argyll ¹	YWK	110	Lan. & Yorks & L.&N.W. Railway Cos.	300, 600	P G	N	0.40
Duke of Clarence ¹	YWL	130	Lancs. & Yorks. Railway Co.	300, 600	P G	N	0.40
Duke of Connaught ¹	YWI	110	Lancs. & Yorks. & L.&N.W. Railway Cos.	300, 600	P G	N	0.40
Duke of Cornwall ¹	XFG	120	Duke of Cornwall S.S. Co., Ltd.	300, 600	P G	X	0.40
Duke of Cumberland ¹	YWJ	110	Lan. & Yorks. & L.&N.W. Railway Cos.	300, 600	P G	N	0.40
Dunfrices ¹	BFA	150	Sutherland S.S. Co., Ltd.	300, 600	P G	X	0.40
Dunra ¹	XGC	160	British India S.N. Co., Ltd.	300, 600	P G	X	0.40
Dunbridge ¹	OCG	180	Canadian Pacific Ocean Services, Ltd.	300, 600	P G	X	0.40
Dunclutha ¹	EZA	—	Scottish Nav. Co. ..	300, 600	P G	X	0.40
Dundrennan ¹	EJI	—	Scottish Nav. Co. ..	300, 600	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio telegram.	
UNITED KINGDOM—cont'd									
Dundrum Castle ¹	YAX	—	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	—	—	Franks.
Dunera ¹	GCU	230	British India S.N. Co., Ltd.	300, 800	P G	X	—	—	—
Dunfermline ¹	EXG	125	Calypso Co., Ltd.	300, 800	P G	X	0.40	—	—
Dungeness ¹	ELQ	150	Litricheux Line, Ltd.	300, 800	P G	X	0.40	—	—
Dunluce Castle ¹	MOO	250	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Dunmail ¹	GBSZ	170	Sharp S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Dunolly ¹	BNW	115	Scottish Nav. Co., Ltd.	300, 800	P G	X	0.40	—	—
Dunrobin ¹	GVO	170	Sutherland S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Dunstan ¹	ZLE	170	Booth S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Dunvegan Castle ¹	MPQ	270	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Duquessa ¹	ZQC	120	Furness Houder Argentine Lines, Ltd.	300, 800	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2202	0.40	—	—
Durham GQC ¹	GQC	300	Federal S.N. Co., Ltd.	300, 800	P G	0900 to 1230 1300 to 1400 1600 to 1800 2000 to 0100	0.40	—	—
Durham XIB ¹	—	—	Thompson S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Durham Castle ¹	MON	220	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Earlswood ¹	YDD	125	Aster Shipping Co., Ltd.	300, 800	P G	X	—	—	—
Easterly ¹	GCKN	—	Frates, Ltd.	—	—	—	—	—	—
Eastcliffe ¹	YXB	—	John Priestman	300, 800	P G	X	0.40	—	—
Eastern City ¹	YUH	250	Eastern & Australian S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Eastgate ¹	VGZ	145	St. Just S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Eastlands ¹	BFH	135	Turnbull, Scott Shipping Co.	300, 800	P G	X	0.40	—	—
Eastwood ¹	YEO	160	J. F. Wilson & Co.	300, 800	P G	X	0.40	—	—
Eaton Hall ¹	ZWN	160	Macbeth & Co., Ltd.	300, 800	P G	X	0.40	—	—
Ebani ¹	EZY	120	Hansen Shipping Co.	300, 800	P G	X	0.40	—	—
Eboe ¹	ZCG	180	British & African S.N. Co.	300, 800	P G	X	0.40	—	—
Eboe ¹	ZTE	200	African S.S. Co.	300, 800	P G	X	0.40	—	—
Ebrua ¹	MTJ	230	Royal Mail Steam Packet Co.	300, 800	P G	X	0.40	—	—
Eburua ¹	ZMV	165	Anglo-Saxon Petro. Co., Ltd.	300, 800	P G	X	0.40	—	—
Edendale ¹	ZWP	120	Weardale S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Eden Hall ¹	ZRF	140	Westcott & Lawrence Line, Ltd.	300, 800	P G	X	0.40	—	—
Edinburgh Castle ¹	MOE	230	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Edith Cavell YCM ¹	YCM	180	Sefton S.S. Co., Ltd.	300, 800	P G	X	0.40	—	—
Edmonton ¹	XHG	—	Canada S.S. Lines, Ltd.	300, 800	P G	X	0.40	—	—

Edmund Hugo Stinnes ¹	GBVR	—	Burdick & Cook	300, 800	P G	—	—	0.40
Eduard Woermann ¹	GBDR	—	Union-Castle Mail S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Egba ¹	220	220	African S.S. Co.	300, 800	P G	X	—	0.40
Eggesford ¹	170	170	Mediterranean Cargo Steamers, Ltd.	300, 800	P G	X	—	0.40
Egori ¹	170	170	African S.S. Co.	300, 800	P G	X	—	0.40
Egra ¹	190	190	British India S.N. Co., Ltd.	300, 800	P G	X	0600 to 0800	0.40
Egremont Castle ¹	145	145	Lancashire Shipping Co., Ltd.	300, 800	P G	X	0900 to 1200	0.40
Egwa ¹	170	170	British & African S.N. Co., Ltd.	300, 800	P G	X	2000 to 2200	0.40
Egypt ¹	250	250	P. & O. S.N. Co., Ltd.	300, 800	P G	X	—	0.40
Egyptian Transport ¹	140	140	Empire Transport Co.	300, 800	P G	X	—	0.40
Ehrenfels ¹	—	—	J. & A. Roxburgh	300, 800	P G	X	—	0.40
Ehrnsfeld ¹	—	—	Glover Bros.	300, 800	P G	X	—	0.40
Elder ¹	140	140	Royal Mail Steam Packet Co.	300, 800	P G	X	—	0.40
Eleen ¹	200	200	S. B. Joel	300, 800	P G	X	—	0.40
Ekaerinoslav ¹	200	200	Royal Mail Steam Packet Co.	300, 800	P G	X	—	0.40
Ekma ¹	190	190	British India S.N. Co., Ltd.	300, 800	P G	X	—	0.40
Elbe ¹	—	—	R. Gordon & Co., Ltd.	300, 800	P G	X	—	0.40
Ebing ¹	—	—	W. Runciman & Co.	300, 800	P G	X	—	0.40
El Cordobes ¹	250	250	British & Argentine S.N. Co., Ltd.	300, 800	P G	X	—	0.40
El Elder Branch ¹	170	170	Nautilus Steamship Co., Ltd.	300, 800	P G	X	—	0.40
Electra ¹	170	170	Eastern Telegraph Co., Ltd.	300, 800	P G	X	—	0.40
Electrician ¹	140	140	Charente S.S. Co.	300, 800	P G	X	—	0.40
Elephanta ¹	200	200	British India S.N. Co., Ltd.	300, 800	P G	X	—	0.40
Elgin ¹	145	145	Sutherland S.S. Co., Ltd.	300, 800	P G	X	—	0.40
El Kabira	—	—	Khediail Mail S.S. & Graving Dock Co., Ltd.	300, 800	P G	X	—	0.40
Elaline	—	—	Morley, Jones & Co.	300, 800	P G	X	—	0.40
Ellawood ¹	—	—	J. MacElvie & Co.	300, 800	P G	X	—	0.40
Ellenga ¹	230	230	British India S.N. Co., Ltd.	300, 800	P G	X	0600 to 0800	0.40
Ellerdale ¹	145	145	Gordon S.S. Co.	300, 800	P G	X	0900 to 1200	0.40
Ellerit ¹	145	145	Lowlands S.S. Co.	300, 800	P G	X	1400 to 1800	0.40
El Lobo ¹	—	—	C. T. Bowring, Ltd.	300, 800	P G	X	2000 to 2200	0.40
Elora ¹	230	230	British India S.N. Co., Ltd.	300, 800	P G	X	—	0.40
Elm Branch ¹	150	150	Nautilus S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Elmina ¹	190	190	African S.S. Co.	300, 800	P G	X	—	0.40
Elmleaf ¹	190	190	Anglo-Saxon Petro. Co., Ltd.	300, 800	P G	X	—	0.40
Elmtree ¹	—	—	The Mandy Shipping Co., Ltd.	300, 800	P G	X	—	0.40
El Paragayo ¹	—	—	Houlder Bros. & Co., Ltd.	300, 800	P G	X	—	0.40
Elpenor ¹	250	250	China Mutual S.N. Co.	300, 800	P G	X	—	0.40
Elswick Grange ¹	155	155	Elswick S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Elswick Hall ¹	—	—	Elswick S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Elswick House ¹	235	235	Elswick S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Elswick Tower ¹	125	125	Elswick S.S. Co., Ltd.	300, 800	P G	X	—	0.40
El Uruguayo ¹	150	150	British & Argentine S.N. Co., Ltd.	300, 800	P G	X	—	0.40
Elveric ¹	250	250	A. Weir & Co.	300, 800	P G	X	—	0.40
Elwick ¹	150	150	Sharp S.S. Co., Ltd.	300, 800	P G	X	—	0.40
Elyria ¹	180	180	Henderson Bros. (Anchor Line)	300, 800	P G	X	—	0.40
Eizasier ¹	150	150	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 800	P G	X	—	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Emerald¹	GBNK	—	Sir A. Du Cros, Bart., M.P.	300, 600	P G	X	0.40	—	
Empire YUI¹	YUI	250	Lowden Connell & Co.	300, 600	P G	X	0.40	—	
Empress¹	GCTB	250	Blue Star Line, Ltd.	300, 450, 600	P G	X	0.40	—	
Empress of Britain¹	GUI	50	S.E. & C. Railway Co.	300, 600	P G	N	0.15	—	
Empress of France¹	MPB	190	Canadian Pacific Railway Co.	300, 600	P G	N	0.40	—	
Enfield¹	GYH	250	Allan Line S.S. Co.	300, 600	P G	N	0.40	—	
Engadine¹	YKE	100	Enfield S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Engineer¹	GUK	50	S.E. & C. Railway Co.	300, 600	P G	N	0.40	—	
Ennisbrook¹	MFO	170	Charente S.S. Co.	300, 600	P G	X	0.40	—	
E. O. Saltmarsh¹	BKG	190	Brook S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Epson¹	ERH	130	Pensacola Trading Co.	300, 600	P G	X	0.40	—	
Erfurt¹	GBMS	—	Lawther, Latta & Co.	300, 600	P G	X	—	—	
Eric Calvert¹	XEK	125	A. Calvert Shipping Co.	300, 600	P G	X	0.40	—	
Eric Petersen¹	GBXN	—	R. Mackill & Co.	300, 600	P G	X	0.40	—	
Erica¹	GVK	110	Sir E. Ohlson	300, 600	P G	X	0.40	—	
Ertner¹	GBYF	—	Furness, Withy & Co., Ltd.	300, 600	P G	X	0.40	—	
Ertner¹	YVX	—	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	X	0.40	—	
Eriupura¹	MVJ	210	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Erivan ZEY¹	ZEY	210	Leyland & MacAndrew, Ltd.	300, 600	P G	X	0.40	—	
Eriburgh¹	GCRD	135	Rowland & Marwood S.S. Co.	300, 600	P G	X	0.40	—	
Ernst¹	YMW	170	J. Crass & Co.	300, 600	P G	X	0.40	—	
Ernest¹	OCJ	150	Johnston Line, Ltd.	300, 600	P G	X	0.40	—	
Eros BTK¹	BTK	120	L. Wright & Co.	300, 600	P G	X	0.40	—	
Eriington Court¹	ZUD	145	Leeston Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Erol¹	BRZ	—	J. Warrack & Co.	300, 600	P G	X	0.40	—	
E. Russ¹	GBWY	—	T. L. Duff & Co.	300, 600	P G	X	0.40	—	
Escalona¹	GPZ	170	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Esakridge¹	YKG	135	N. of England S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Esakwood¹	GCTY	—	E. Johnson & Co., Ltd.	300, 600	P G	X	0.40	—	
Esakmo¹	GCSV	250	Ellermans Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Esperanza de Larrinaga¹	EMC	170	Miguel de Larrinaga S.S. Co., Ltd.	300, 600	P G	0800 to 1300 1400 to 1900 2000 to 2400 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Essequibo¹	MTK	230	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Frans.	Frans.	
Fernfield ¹	OCF	145	Tower S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Fernleigh ¹	YKR	140	Barr. Crombie & Co.	300, 600	P G	X	0.40	—	
Fernleat ¹	EZE	170	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
Fernley ¹	YFK	145	—	300, 600	P G	X	0.40	—	
Fielmarshal	ZWQ	—	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Fife ¹	EKG	145	Sutherland S.S. Co.	300, 600	P G	X	0.40	—	
Figuig ¹	ZLV	—	Red Croft S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
						0600 to 0800			
						0900 to 1200			
						1400 to 1800			
						2000 to 2200			
Filey ¹	MGY	130	Hull S. Fishing and Ice Co., Ltd.	300, 600	P G	X	0.40	—	
Finchley ¹	YEX	135	Watts, Watts & Co., Ltd.	300, 600	P G	X	0.40	—	
Firtree ¹	XIG	120	Tree S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Fishpool ¹	ZWL	150	Pool S. Co., Ltd.	300, 600	P G	X	0.40	—	
Flamman ¹	YLY	150	Ellerman Lines, Ltd.	300, 600	P G	X	0.40	—	
Flamma ¹	OFR	—	Gas Light & Coke Co.	300, 600	P G	X	0.40	—	
Flandrier ¹	MSX	125	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	X	0.40	—	
						0.50 ²⁰			
Flixton ¹	ELU	—	R. A. McClelland	300, 600	P G	X	0.40	—	
Flying Breeze	EPD	—	Alexandra Towing Co., Ltd.	300, 600	P G	X	—	—	
Forfic ¹	BMV	—	J. Langdon Rees, Ltd.	300, 600	P G	X	0.40	—	
Forfar ¹	GCLK	—	B. J. Sutherland & Co., Ltd.	300, 600	P G	X	0.40	—	
Fort ¹	GBYC	—	C. Dodd & Co.	300, 600	P G	X	0.40	—	
Fort Victoria ¹	GCTN	—	Furness, Withy & Co., Ltd.	300, 600	P G	X	0.40	—	
Fotima ¹	ZXS	—	National S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Foye ZUR ¹	ZUR	150	Mercantile S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Framlington Court ¹	ERV	135	Court Line, Ltd.	300, 600	P G	X	0.40	—	
Francis ¹	MDG	170	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Francis Batey	GZI	—	J. Batey & Son, Ltd.	300, 600	P G	X	0.40	—	
Francisco ¹	GCSW	250	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
						0800 to 1300			
						1400 to 1700			
						1800 to 2200			
Frankburn ¹	YDX	—	Palace Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Frankby ¹	BEA	—	Palace Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Frankdale ¹	GBPK	135	Palace Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Frankenfeis ¹	BRI	—	Grahams & Co.	—	—	—	—	—	
Frankfurt ¹	GBJF	—	Oceanic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Frankler ¹	YHf	145	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	X	0.40	—	

Franklinver ¹	BOF	—	Palace Shipping Co., Ltd.	300, 600	P G	..	0.40
Frankere ¹	ZUL	250	Palace Shipping Co., Ltd.	300, 600	—	..	—
Frank Parish ¹	MAD	120	Buenos Aires G.S. Ry. Co., Ltd.	300, 600	P G	..	0.40
Frankton ¹	YGD	120	Palace Shipping Co., Ltd.	300, 600	P G	..	0.40
Frankton ¹	GBLD	—	Houlder Middleton & Co., Ltd.	300, 600	P G	..	0.40
Frank Wilke ¹	GBRM	—	W. Runciman & Co., Ltd.	300, 600	P G	..	0.40
Fraser River ¹	ZEG	150	British Empire S.N. Co., Ltd.	300, 600	P G	..	0.40
Freiberg ¹	GCSD	—	British India S.N. Co., Ltd.	—	—	..	—
Freienfels ¹	ZPJ	—	Oranien & Co.	300, 600	—	..	—
Friedrichsruhe ¹	GBKM	—	Orient S.N. Co., Ltd.	300, 600	P G	..	0.40
Freshwater ¹	ETS	170	Seton S.S. Co., Ltd.	300, 600	P G	..	0.40
Fritz ¹	GCVK	—	Glen Line, Ltd.	—	—	..	—
Fronenac ¹	XVY	—	Denaby & Cadeby Main Collieries, Ltd.	300, 600	P G	..	—
Fullerton ¹	BKZ	—	—	—	—	..	—
Fulmar ¹	GRNW	130	Cork S.S. Co., Ltd.	300, 600	P G	..	0.05 ³⁰
Fulula ¹	GDC	210	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Furst Bulow ¹	GBCX	—	Lawther Latta & Co.	300, 600	P G	..	0.40
Gaboon ¹	ZMK	170	British & African S.N. Co., Ltd.	300, 600	P G	..	0.40
Gaelic Prince ¹	XIW	160	Prince Line, Ltd.	300, 600	P G	..	0.40
Gaika ¹	MOU	230	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	0.40
Gairsoppa ¹	GCZB	180	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Galleo ¹	GII	200	Ellerman's Wilson Lines, Ltd.	300, 600	P G	..	0.40
Gallie ¹	MVO	150	Oceanic S.N. Co.	300, 600	P G	..	0.40
Gallipoli ¹	GBFS	—	Rankin Gilmour & Co., Ltd.	300, 600	P G	..	0.40
Gallie More ¹	GUU	250	L.&N.W. Railway Co.	300, 600	P G	..	0.50 ³⁰
Galtymore ¹	GBNV	180	Johnston Line, Ltd.	300, 600	P G	..	0.40
Gambria ¹	GCZF	—	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Gambada ¹	ZNF	—	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Gambhira ¹	GCQY	150	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Gambia ¹	ESH	170	British & African S.N. Co., Ltd.	300, 600	P G	..	0.40
Gambia River ¹	ZEH	150	British Empire S.N. Co., Ltd.	300, 600	P G	..	0.40
Gandara ¹	GCMR	170	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Ganelon ¹	GBRP	—	R. S. Dalgligh	300, 600	P G	..	0.40
Ganges ¹	GWJ	115	James Nourse, Ltd.	300, 600	P G	..	0.40
Garada ¹	GCMS	180	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Garbata ¹	GCYX	—	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Gardenia ¹	BFO	135	Stag Line, Ltd.	300, 600	P G	..	0.40
Garmula ¹	GCZJ	—	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Garvalle ¹	ELH	160	Dawson Bros.	300, 600	P G	..	0.40
Garth Castle ¹	MQP	250	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	0.40
Gascon ¹	MOV	220	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	..	0.40
Gasconier ¹	OEU	120	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	..	0.40
Gazana ¹	GCYZ	—	British India S.N. Co., Ltd.	300, 600	P G	..	0.40
Geddington Court ¹	EUN	—	Court Line, Ltd.	300, 600	P G	..	0.40
General Allenby ¹	ZZB	—	S. R. Sequerra	300, 600	P G	..	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Francia.	Francia.	
General Church ¹	BOL	130	Byron S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
General William ¹	XWC		English S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
General Gordon ¹	BNL	135	Anglo-American Oil Co.	300, 600	P G	X	0.40	—	
Genesee MIT ¹	MIT	135	R. Redhead & Son, Ltd.	300, 600	P G	X	0.40	—	
George V ¹	BIS	—	Phillipps, Phillipps & Co., Ltd.	300, 600	P G	X	0.40	—	
Gerent ¹	GBLN	—	J. Westoll	300, 600	P G	X	0.40	—	
Gerent ¹	XEO	145	C. T. Bowring & Co.	300, 600	P G	X	0.40	—	
Gerrard ¹	GBMF	—	W. H. Cokerline & Co.	300, 600	P G	X	0.40	—	
Gerranic ¹	YLX	120	Sir R. Ropner & Co., Ltd.	300, 600	P G	X	0.40	—	
Germanicus ¹	GBCV	—	Gellatly Hankey & Co.	300, 600	P G	X	0.40	—	
Gertrud ¹	GBDV	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Gharinda ¹	GCDD	—	M. H. Bland & Co., Ltd.	300, 600	P G	X	0.40	—	
Gibel Yedid ¹	BRS	—	Lampart & Holt, Ltd.	300, 600	P G	X	0.40	—	
Giesen ¹	GBFK	—	Thomas Radcliffe & Co., Ltd.	300, 600	P G	X	0.40	—	
Gileston ¹	XIJ	140	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Gladstone ¹	VER	160	Alexandra Towing Co., Ltd.	300, 600	P G	X	0.40	—	
Gladstone ¹	FOA	—	Marga S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Glamorgan ¹	BFP	150	Royal Mail Steam Packet Co.	300, 600	P G	X	0.40	—	
Glamorganshire ¹	BHI	150	Rankine Line, Ltd.	300, 600	P G	X	0.40	—	
Glasgow ¹	EJO	150	Mann, McNeal & Co., Ltd.	300, 600	P G	X	0.40	—	
Glasgow ¹	GDCF	—	Norfolk & N. American S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Glastonbury ¹	BAI	180	Transport & Trading Co., Ltd.	300, 600	P G	X	0.40	—	
Gledhow ¹	YNO	—	Glen Line Ltd. (Macgregor Gow & Co., Ltd.)	300, 600	P G	X	0.40	—	
Glenade ¹	GBQC	190	Rio Cape Line, Ltd.	300, 600	P G	X	0.40	—	
Glenaffric ¹	BDC	160	Glen Line (Macgregor Gow & Co., Ltd.)	300, 600	P G	X	0.40	—	
Glenamoy ¹	ZLP	170		300, 600	P G	X	0.40	—	
									0.40 to 0800 0900 to 1200 1400 to 1800 2000 to 2200
Glenapp ¹	XKF	155	Glen Line (Macgregor Gow & Co., Ltd.)	300, 600	P G	X	0.40	—	
Glenariffe ¹	GCLM	—	Glen Line (Macgregor Gow & Co., Ltd.)	300, 600	P G	X	0.40	—	
Glenavy ¹	ZLB	155	Glen Line (Macgregor Gow & Co., Ltd.)	300, 600	P G	X	0.40	—	
Glenbridge ¹	GWX	145	Leeson Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Glendevon ¹	YRT	145	Rio Cape Line, Ltd.	300, 600	P G	X	0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range In Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							France.	France.	
Gondia ¹	GCMN	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Gondola ¹	GCKP	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Goortha ¹	QOW	230	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Gorala ¹	GCLD	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Gorden Castle ¹	ZNN	170	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Gordonia ¹	ZTL	—	Gordon S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Gothic ¹	BJV	190	W. H. Cockcroft & Co.	300, 600	P G	X	0.40	—	
Gothic Prince ¹	XIU	155	Prince Line, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Gourko ¹	ODX	120	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Governor ¹	ENE	140	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Gracchus ¹	GDF	180	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Gracefield ¹	OCY	130	Wm. Thomas & Sons, Ltd.	300, 600	P G	X	0.40	—	
Graciana ¹	ZFD	160	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Graf Stroganoff ¹	ZOU	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Graf Waldersee	GBZM	—	P. & O. S.N. Co., Ltd.	300, 600	P G	X	—	—	
Grantont ¹	YPN	150	Carlton S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Grampian ¹	MRN	230	Allen Line, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Grampian Range ¹	ZNC	140	Neptune S.N. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Grangemouth ¹	GBNP	170	Rankine Line, Ltd.	300, 600	P G	X	0.05	0.50	
Grangepark ¹	GCNW	—	Denholm S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Grantley ¹	OEC	125	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Grantully Castle ¹	MOQ	210	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Graphic ¹	LSY	160	Belfast S.S. Co., Ltd.	300, 600	P G	X	0.05 ⁸⁰	0.50 ²⁰	
Gray ¹	YBL	—	Victoria Whaling Co., Ltd.	300, 600	P R	X	—	—	
Great City ¹	MKW	200	St. Just S.S. Co., Ltd.	300, 600	P G	X	—	—	
Great Southern ¹	YZV	110	G.W. Railway Co.	300, 600	P G	X	0.40	—	
Great Western ¹	YZW	110	G.W. Railway Co.	300, 600	—	—	—	—	

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Min-imum per Radio-tele-gram	
UNITED KINGDOM—contd.									
Hamburg ¹	GBMR	—	W. A. Young & Co.	300, 600	P G	X	0.40	—	France.
Hamm ¹	ZXT	170	Federal S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hamstead ¹	EZT	135	Watts, Watts & Co., Ltd.	300, 600	P G	X	0.40	—	—
Hamstead Heath ¹	EIE	180	S.N. Co. of Canada, Ltd.	300, 600	P G	X	0.40	—	—
Hannah ¹	ZYA	—	Rahkens S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hannington Court ¹	LUB	150	Court Line, Ltd.	300, 600	P G	X	0.40	—	—
Hannover ¹	GPYX	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	—
Hans Hemsoth ¹	XKU	125	Everett & Newbigh	—	—	—	—	—	—
Hans Wilhelm Hemsoth ¹	GBWV	—	Haldin & Co., Ltd.	300, 600	P G	X	0.40	—	—
Hantonia ¹¹⁶	GIL	170	L. & S.W. Railway Co.	300, 600	P G	N	0.15	1.50 ¹⁰	—
Harold Casper ¹	XXY	150	Swift S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hardanger ¹	MOB	125	G. B. Harland & Co.	300, 600	P G	X	0.40	—	—
Haresfield ¹	GBQR	160	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hartem ¹	BGS	145	Harlem S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Harlow ¹	YAR	120	Harrison's, Ltd.	300, 600	P G	X	0.40	—	—
Harleywood ¹	BUH	140	Constantine & Pickering S.S. Co.	300, 600	P G	X	0.40	—	—
Harmonius ¹	GCBX	150	Brit. & S. America S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Harmonic ¹	GCBO	120	Maindy Shipping Co., Ltd.	300, 600	P G	X	0.40	—	—
Harmonides ¹	GCKW	180	Brit. & S. American S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Harperley ¹	EXC	180	J. & C. Harrison, Ltd.	300, 600	P G	X	0.40	—	—
Hartfield ¹	EVL	145	Woodfield S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hartington ¹	MJX	145	J. & C. Harrison, Ltd.	300, 600	P G	X	0.40	—	—
Hartlepool ¹	ZWS	160	Pool Shipping Co., Ltd.	300, 600	P G	X	0.40	—	—
Hartmore ¹	YXL	—	Johnston Line, Ltd.	300, 600	P G	X	0.40	—	—
Hartside ¹	ZNI	130	Charlton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Harvesthede ¹	GBQD	—	R. S. Daigliesh, Ltd.	300, 600	P G	X	0.40	—	—
Haslemere ¹	VXI	120	Furness, Withy & Co., Ltd.	300, 600	P G	N	0.40	—	—
Hatavana ¹	VUZ	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hatimura ¹	XJB	150	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hatkhola ¹	VUY	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hatipara ¹	BHH	150	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Haverford ¹	MIH	250	International Nav. Co., Ltd.	300, 600	P G	N	0.40	—	—
Havildar ¹	BMD	180	Asiatic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Havre ¹	ZEW	135	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	—
Haworth ¹	GBFN	—	Daigliesh S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hawsker ¹	YFP	150	Thos. Turnbull & Sons S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hazel Branch	ZGZ	150	Nautilus S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Hazelnor ¹	YH	145	Moore Line, Ltd.	300, 600	P G	X	0.40	—	—

Ship	Station	Lat	Long	Company	Agent	Notes
Hazelside ¹	GCKT	140	135	Charlton S.S. Co., Ltd.	..	..
Headcliffe ¹	EUE	135	135	Cliffe S.S. Co., Ltd.	..	..
Heathmore ¹	MXS	135	135	Davies & Co.	..	..
Heathside ¹	GXX	135	135	Charlton S.S. Co., Ltd.	..	..
Hebburn ¹	ELV	135	135	Huddart Parker, Ltd.	..	..
Hebe ¹	GBLJ	135	135	C. T. Bowring & Co., Ltd.	..	..
Hector ¹	ZIS	135	135	Ocean S.S. Co., Ltd.	..	..
Hedwig Heidmann	GBXJ	135	135	A. Crawford & Co.	..	..
Heilbrunn	GBFD	135	135	Geo. Dodd & Co., Ltd.	..	..
Helennus ¹	ZIT	135	135	Ocean S.S. Co., Ltd.	..	..
Helenes ¹	EOW	135	135	Britt & S. American S.N. Co., Ltd.	..	..
Helmstedt ¹	YEG	135	135	Strath S.S. Co., Ltd.	..	..
Helmstedale ¹	ZXB	135	135	Strath S.S. Co., Ltd.	..	..
Helredale ¹	YHC	135	135	Turnbull, Scott & Co.	..	..
Heluan ¹	GBDN	135	135	Elder Dempster & Co., Ltd.	..	..
Hendon ¹	YTS	135	135	Cory Colliers, Ltd.	..	..
Henry Holmes	XJH	135	135	West India & Panama Tel. Co. Ltd.	..	..
Henzada ¹	GWD	135	135	Burma S.S. Co., Ltd.	..	..
Herefordshire ¹	MYA	250	135	Bibby S.S. Co., Ltd.	..	..
Herman Sauber ¹	GBNY	250	135	Pelton S.S. Co., Ltd.	..	..
Hermione END ¹	END	200	135	Pelton S.S. Co., Ltd.	..	..
Hermione ¹ GCKX	GCKX	200	135	Britt & S. American S.N. Co., Ltd.	..	..
Hermit ¹	OES	200	135	Anglo-Saxon Petroleum, Co., Ltd.	..	..
Heroic ¹	GCTX	200	135	Belfast S.S. Co.	..	..
Herspool ¹	BFI	145	135	Pool Shipping Co.	..	..
Herschel ¹	MUA	186	135	Lampert & W. Ltd.	..	..
Hesfeld ¹	CBSD	186	135	F. C. Strick & Co., Ltd.	..	..
Hesleysid ¹	ZXH	186	135	L. & N.W. Ry. Co., Ltd.	..	..
Hibernia ¹	GCML	186	135	Charlton S.S. Co., Ltd.	..	..
Highland Enterprise ¹	MDA	170	135	Nelson Line (L'pool), Ltd.	..	..
Highland Glen ¹	GIR	200	135	Nelson S.N. Co., Ltd.	..	..
Highland Heather ¹	MEK	230	135	Nelson Line (L'pool), Ltd.	..	..
Highland Laddie ¹	GIU	200	135	Nelson S.N. Co., Ltd.	..	..
Highland Laird ¹	MEP	180	135	Nelson Line (L'pool), Ltd.	..	..
Highland Loch ¹	GIV	220	135	Nelson S.N. Co., Ltd.	..	..
Highland Piper ¹	GNM	220	135	Nelson S.N. Co., Ltd.	..	..
Highland Pride ¹	GJA	230	135	Nelson S.N. Co., Ltd.	..	..
Highland Rover ¹	GIB	200	135	Nelson S.N. Co., Ltd.	..	..
Highland Star ¹	ZLH	220	135	Nelson Line (L'pool), Ltd.	..	..
Highland Watch ¹	MER	230	135	R. Gordon & Co.	..	..
Hilda ¹	GBVQ	400	135	Booth S.S. Co., Ltd.	..	..
Hildebrand ¹	MDM	400	135	J. Cormack & Co.	..	..
Hilde Hugo Stinnes ¹	GBXF	145	135	Seville & U.K. Carrying Co., Ltd.	..	..
Hillhouse ¹	LTF	135	135	Cory Colliers, Ltd.	..	..
Hillingdon ¹	MYT	135	135	P. & O. S.N. Co., Ltd.	..	..
Himalaya ¹	MNV	135	135	Ellerman's Wilson Line, Ltd.	..	..
Hindoo ¹	YPZ	135	135	Ellerman's Wilson Line, Ltd.	..	..
Hindu	VUH	135	135	Hindustan S.S. Co., Ltd.	..	..
Hindustan ¹	ZNO	180	135	Charente S.S. Co., Ltd.	..	..
Hitchin ¹	MHT	210	135	Cory Colliers, Ltd.	..	..
Hitchin ¹	BAA	210	135	Cory Colliers, Ltd.	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
H. M. Pellatt ..	YJV	125	Canada S.S. Lines, Ltd.	300, 600	P G	X	0.40	—	
Hocking ¹ ..	XFA	170	J. Cory & Sons, Ltd.	300, 600	P G	X	0.40	—	
Holbein ¹ ..	MUB	190	Lampert & Holt, Ltd.	300, 600	P G	X	0.40	—	
Holbrook ¹ ..	BPU	200	Canadian Pacific Ocean Services, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Hollinside ¹ ..	ZXU	150	Charlton Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Holms Island ¹ ..	EZJ	220	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
Holtby ¹ ..	ZMD	150	Marshall Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Holywell ¹ ..	BOW	140	Sir R. Koppner & Co., Ltd.	300, 600	P G	X	0.40	—	
	YED	150	Well Line, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Honyayun ¹ ..	GCDS	—	Bombay & Persia S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Homefield ¹ ..	YAU	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Homer City ¹ ..	GAB	220	St. Just S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Homerus ¹ ..	GPB	—	Oceanic S.N. Co., Ltd.	300, 600	P G	N	0.40	—	
Honorius ¹ ..	GJE	170	Brit. & S. American S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Hopelyn ¹ ..	VEI	120	Hopemount S.S. Co., Ltd.	300, 600	P G	X	0.15 ³¹	1.50 ³¹	
Horden ¹ ..	EVR	115	Burnett & Co.	300, 600	P G	X	0.40	—	
Hornby Castle ¹ ..	ZVM	160	Lancashire Shipping Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Horncap ¹ ..	GBFN	—	Macbeth & Co., Ltd.	300, 600	P G	X	0.40	—	
Hornchurch ¹ ..	GCGL	125	J. Hudson & Co., Ltd.	300, 600	P G	X	0.50	—	
Hornfels ¹ ..	GBFR	—	Sir R. Koppner & Co., Ltd.	300, 600	P G	X	0.40	—	
Hornsee ¹ ..	GBLZ	—	J. Westall ..	300, 600	P G	X	0.40	—	
Hornsey ¹ ..	ZAT	115	Cory Colliers, Ltd.	300, 600	P G	X	0.50 ³⁰	0.50 ³⁰	
Horn Shell ¹ ..	XLC	210	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Honorata ¹ ..	MRF	230	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Horseferry ¹ ..	XFO	100	Gas Light & Coke Co., Ltd.	300, 600	P G	X	0.40	—	
Hortensius ¹ ..	ETG	170	Brit. & S. American S.N. Co., Ltd.	300, 600	P G	X	0.50 ³⁰	0.50 ³⁰	
Hotham ¹ ..	EOX	190	Brit. & S. American S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Hotham Newton ¹ ..	XHI	145	Leonado Carrying Co., Ltd.	300, 600	P G	X	0.40	—	
Hounslow ¹ ..	YKI	120	British S.S. Co., Ltd.	300, 600	P G	X	—	—	
Hova BGQ ¹ ..	BGQ	170	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	X	—	—	

Hunchaco ¹	GJF	200	Pacific S.N. Co., Ltd.		300,000					2000 to 0200	0.40
Huberfels ¹	GBRV	—	Glen & Co.	..	300,000	P G	..	..	X	2000 to 0200	0.40
Hubert ¹	MVI	180	Booth S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 0200	0.40
Huddersfield ¹	YGC	170	W. Hepburn & Co.	..	300,000	P G	..	..	X	2000 to 0200	0.40
Hunnie ¹	BRM	—	Grahams & Co.	..	—	—	..	..	—	—	—
Hunsbrook ¹	ZDI	—	G. Heyn & Sons, Ltd.	..	—	—	..	..	—	—	—
Hunsgate ¹	ZVI	120	W. Robertson	..	300,000	P G	..	..	—	0600 to 0800	0.40
										0900 to 1200	
										1400 to 1800	
										2000 to 2200	
Hunslet ¹	BSK	170	Union-Castle Mail S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hunstanworth ¹	GCDZ	170	Robert Stanley Shipping Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hunsworth ¹	LSB	200	John Herring & Co.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntball ¹	VCV	160	Anglo-Saxon Petro. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntress ¹	VXU	—	British India S.N. Co., Ltd.	..	300,000	—	..	..	—	—	—
Huntscape ¹	ZQU	170	W. Robertson	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntscastle ¹	ZQU	170	Union-Castle Mail S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntslyde ¹	BEJ	—	Clyde Shipping Co.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntscraft ¹	YTI	170	Union-Castle S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntbend ¹	YRZ	150	Union-Castle Mail S.S. Co., Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Huntsgreen ¹	YRQ	150	Union-Castle Mail S.S. Co., Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Huntsgulf ¹	YRR	150	Strick Line, Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Huntshhead ¹	YEN	150	Jenkins Bros.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huntspill ¹	ZTQ	240	Union-Castle Mail S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hurdiss ¹	BNI	135	W. R. Smith & Sons	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hurona ¹	VVE	145	S.S. Convey Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Huronian ¹	VZM	200	F. Leyland & Co., Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Hurstide ¹	ENV	160	Charlton S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hyacinthus ¹	GJG	200	Brit. & S. American S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hyanthus ¹	EJJ	190	Brit. & S. American S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hydaspes ¹	GJH	200	Brit. & S. American S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hytonia ¹	YQV	125	Mandy Shipping Co.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hygmetus ¹	GJPL	170	British India S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hypatia ¹	GPI	190	Brit. & S. American S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hyrancia ¹	ZZS	145	Casplan Oil Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Hyson ¹	ZKI	180	China Mutual S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Ibex ¹	MSC	120	G.W. Railway Co.	..	300,000	P G	..	..	N	0900 to 1300	0.40
Idaho ¹	GJJ	250	Ellerman's Wilson Line, Ltd.	..	300,000	P G	..	..	0900 to 1300	1400 to 1700	0.40
									1800 to 2200		
Ida Zelck ¹	GCVP	—	Bell Bros. & Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Idesleigh ¹	ELF	140	Mediterranean Cargo Steamers Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Idomeneus ¹	CZY	210	Ocean S.S. Co., Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Ikala ¹	ZUT	170	Leyland S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Iford ¹	YKL	145	British S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imenau ¹	GBYN	135	Geo. Heyn & Sons	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imani ¹	ZDO	—	T. & J. Brocklebank, Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imber ¹	YVD	160	Cork S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imkentum	GCVI	—	Cork S.S. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imkntur ¹	YVD	160	British India S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40
Imperator ¹	GBZW	—	Cunard Line	..	300,000	P G	..	..	X	2000 to 2200	0.40
Inanda ¹	MID	180	Charante S.S. Co., Ltd.	..	300,000	P G	..	..	N	2000 to 2200	0.40
Iaca MIF ¹	MIF	190	Pacific S.N. Co., Ltd.	..	300,000	P G	..	..	X	2000 to 2200	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Inchmear ¹	YIJ	145	W. Runciman & Co., Ltd.	300, 600	P G	X	0.40	—	
Indian ¹	MHB	190	F. Leyland & Co., Ltd.	300, 600	P G	N	0.40	—	
Indiana ZFF ¹	ZFF	180	Furness Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Indian Transport ¹	ZDR	120	Empire Transport Co., Ltd.	300, 600	P G	X	0.40	—	
Indianola ¹	ODF	145	Gulf Transport Co. (Liverpool), Ltd.	300, 600	P G	X	0.40	—	
Indore ¹	GMI	210	Elder Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	
Inglesby ¹	MXI	140	Sir R. Ropner & Co., Ltd.	300, 600	P G	X	0.40	—	
Ingoma ¹	GDV	—	Charente S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Irishboffin ¹	LSN	—	Limerick S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Inkalla ¹	ODG	—	Gulf Transport Co. (Liverpool), Ltd.	300, 600	P G	X	0.40	—	
Innerton ¹	YFN	—	R. Chapman & Son	300, 600	P G	X	0.40	—	
Intaba ¹	MIP	180	Charente S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Intombi ¹	ZIL	180	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Inventor ¹	MVY	180	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Inverawe ¹	ZTD	135	Leith, Hull & Hamburg S.S. Co.	300, 600	P G	X	0.40	—	
Inveresk ¹	EOU	110	Alby United Carbide Factories, Ltd.	300, 600	P G	X	0.15 ²¹	1.50 ²¹	
Inveric ¹	EPY	150	S.S. "Inveric" Co., Ltd.	300, 600	P G	X	0.40	—	
Inverness ¹	EUU	140	Sutherland S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Invicta ²	GUL	50	S.E. & Chatham Railway	300, 600	P G	N	0.40	—	
Ioanna ³	EXO	135	International Nav. Co.	300, 600	P G	X	0.40	—	
Ionic ¹	MWI	230	Oceanic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Iris MNI ¹	MNI	200	Pacific Cable Board	300, 600	P	X	—	—	
Irishman ¹	GJK	220	Oceanic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Irish Monarch ¹	YGR	170	Monarch S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Irismeri ¹	OCB	150	T. Law & Co.	300, 600	P G	X	0.40	—	
Irmgard ¹	GBID	150	T. Dunlop & Sons	300, 600	P G	X	0.40	—	
Irmgaard ¹	MEI	160	Anglo-American Oil Co., Ltd.	300, 600	P G	X	0.40	—	
Iserlohn ¹	GCWB	155	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Isis GAP ¹	GAP	155	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Isis GBMY ¹	GBMY	155	Philippis, Philipps & Co., Ltd.	300, 600	P G	X	0.40	—	
Islandia ¹	XIN	190	Laurium Transport Co.	300, 600	P G	X	0.40	—	
Isle of Lewis ¹	BNG	135	Isle S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Ismaïia ¹	GCOD	180	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ismaïlia ¹	ZYH	140	Khedival Mail S.S. & Graving Dock Co.	300, 600	P G	X	0.40	—	

Itaby ¹	GBCQ	150	GCQF	British India S.N. Co., Ltd.	300, 800	P G	..	0.40
Italy MAR ¹	MAR	200	GBXJ	R. S. Daigles, Ltd.	300, 800	P G	..	0.40
Italian ¹	ZLR	130	GCQJ	British India S.N. Co., Ltd.	300, 800	P G	..	0.40
Italian Prince ¹	ZGK	170	XEP	Franco-British S.S. Co., Ltd.	300, 800	P G	..	0.40
			XWB	Bishop Nav. Co., Ltd.	300, 800	P G	..	0.40
			GRZ	China Mutual S.S. Co., Ltd.	300, 450, 800	P G	..	0.40
			EVH	Western Counties S.S. Co., Ltd.	300, 800	P G	..	0.40
			BPD	Canadian Maritime Co., Ltd.	300, 800	P G	..	0.40
			LTB	Cork S.S. Co. Ltd.	300, 800	P G	..	0.40
			GVN	W. A. Young & Co.	300, 800	P G	..	0.40
			YSI	Royal Mail Steam Packet Co.	300, 800	P G	..	0.40
			ESR	S.S. Janeta Co. Ltd.	300, 800	P G	..	0.40
			GSR	British India S.N. Co., Ltd.	300, 800	P G	..	0.40
			GLH	Ocean S.S. Co., Ltd.	300, 800	P G	..	0.40
			GBRQ	G. Dodd & Co.	300, 800	P G	..	0.40
			YUX	Elder Dempster & Co., Ltd.	300, 800	P G	..	0.40
Jedmoor ¹	YMC	145		Moor Line, Ltd.	300, 800	P G	..	0.40
Jenny ¹	GBYM	135		Owen Watkin, Williams & Co.	300, 800	P G	..	0.40
Jervaulx Abbey ¹	ENK	140		Moor Line, Ltd.	300, 800	P G	..	0.40
Jessic ¹	ZOW	70		Hull & Netherland S.S. Co., Ltd.	300, 800	P G	..	0.40
Joffre ¹	BRP	70		Bank Line, Ltd.	300, 800	P G	..	0.40
John Heidmann ¹	GBVT	120		Lawson S. Tug Boat Co., Ltd.	300, 800	P G	..	0.40
John Pender ¹	MEF	200		J. Cormack & Co.	300, 450, 800	P	..	0.40
John Sanderson ¹	BCI	105		Eastern Telegraph Co., Ltd.	300, 800	P G	..	0.40
Jolly Helen ¹	YBS	150		Taylor & Sanderson S.S. Co., Ltd.	300, 800	P G	..	0.40
Jolly Inez ¹	EPH	130		Canadian Maritime Co., Ltd.	300, 800	P G	..	0.40
Judson ¹	LSI	130		Entente S.S. Co., Ltd.	300, 800	P G	..	0.40
Junia ¹	GJL	200		Juliston S.S. Co., Ltd.	300, 800	P G	..	0.40
Jura ¹	BNG	135		Pacific S.N. Co., Ltd.	300, 800	P G	..	0.40
Justin ¹	YPL	220		B. J. Sutherland & Co., Ltd.	300, 800	P G	..	0.40
Kabinga ¹	GCQN	140		Booth S.S. Co., Ltd.	300, 800	P G	..	0.40
Kaduna ¹	ZMS	170		Ellerman & Bucknall S.S. Co., Ltd.	300, 800	P G	..	0.40
Kafir Prince ¹	ZFT	160		Imperial Direct Line, Ltd.	300, 800	P G	..	0.40
Kahira (El)	DRE	—		Prince Line, Ltd.	300, 800	P G	..	0.40
Kaikoura ¹	MRS	230		Khetval Mail S.S. & Graving Dock Co., Ltd.	300, 800	P G	..	0.40
Kaiping ¹	YBB	145		New Zealand S.S. Co., Ltd.	300, 800	P G	..	0.40
Kaiser-I-Hind ¹	MSI	230		Chinese Engineering & Mining Co., Ltd.	300, 800	P G	..	0.40
Kaiwarra ¹	GCDY	—		P. & O. S.N. Co., Ltd.	300, 800	P G	..	0.40
				Union S.S. Co. of New Zealand, Ltd.	300, 800	P G	..	0.40

Ship Stations—Continued

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[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Linga ¹ ..	GLJ	160	British India S.N. Co., Ltd.	300, 600	P G	X	Francs.	Francs.	
Lingfield ¹ ..	YDW	145	Woodfield S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Linnmore ¹ ..	ZUK	145	Johnston Line, Ltd. ..	300, 600	P G	X	0.40	—	
Linnet ² ..	MKI	150	Liverpool Assoc. for Protection of Commercial Interests as respects Wrecked and Damaged Property	300, 600	P	X	0.40	0.50	
Lippe ..	GBFW	—	Cairns, Noble & Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lipson ¹ ..	GBHQ	—	Lyle Shipping Co., Ltd. ..	300, 600	P G	X	0.40	—	
Livingstonia ¹ ..	YLN	150	S.S. Livingstonia, Ltd. ..	300, 600	P G	X	0.40	—	
Livorno ¹ ..	ODO	125	Ellerman's Wilson Line, Ltd. ..	300, 600	P G	X	0.40	—	
Lizzy ¹ ..	GBSK	—	C. T. Bowring & Co., Ltd. ..	300, 600	P G	X	0.40	—	
Llanberis ¹ ..	ZSJ	150	Llanberis, S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Llangollen ¹ ..	YXE	150	Llangollen S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Llangorse ¹ ..	EXF	150	Llangorse S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Llanstaphan Castle ¹ ..	MJT	230	Union-Castle Mail S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Llanthony Abbey ¹ ..	ENP	—	Allen Adams & Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lochiel ..	YCT	—	David, MacBrayne, Ltd. ..	300, 600	P G	X	0.40	—	
Loch Lomond ¹ ..	ELI	155	Lomont Shipping Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lodorer ¹ ..	YDJ	160	Houlder Middleton & Co. Ltd. ..	300, 600	P G	X	0.40	—	
Logic ¹ ..	ISL	120	Belfast S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Logician ¹ ..	ENW	170	Charente S.S. Co. ..	300, 600	P G	X	0.40	—	
Lompoc ¹ ..	ENH	300	Bear Creek Oil & Shipping Co., Ltd. ..	300, 600	P G	X	0.05	0.50	
Londonderry ² ..	GPR	150	Midland Railway Co. ..	300, 600	P G	X	0.40	—	
Longnewton ¹ ..	ZPW	105	D. N. Grimes ..	300, 400, 600 ⁴⁴	P R	X	0.40	—	
Loos ¹ ..	ODM	140	Union Shipping & Trading Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Anttrim ¹ ..	ZDM	150	Ulster S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Byron ¹ ..	ZVL	150	Byron S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Darnley ¹ ..	YDY	145	Ulster S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Guildford ¹ ..	GCNX	—	Byron S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Kelvin ² ..	YRC	250	Anglo-American Tel. Co., Ltd. ..	300, 600	P	X	0.40	—	
Lord Rhonda ¹ ..	YFV	110	Redlands Shipping Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lord Sefton ¹ ..	ZVB	150	Occidental & Oriental S.N. Co. ..	300, 600	P G	X	0.40	—	
Lord Strathcona M.V.	MVY	220	S.S. Lord Latham Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lorina ¹ ..	YLV	150	Lake & Van Hookway Co., Ltd. ..	300, 600	P G	X	0.40	—	
Louth ¹ ..	YLV	150	Lake & Van Hookway Co., Ltd. ..	300, 600	P G	X	0.40	—	
Lower Castle ¹ ..	ZLGN	140	Lancashire Shipping Co., Ltd. ..	300, 600	P G	X	0.40	—	

	YCK ZWP	145 —	Loyal Line, Ltd. H. E. Moss & Co's. Tankers, Ltd.	300, 600 300, 600	P G P G	2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2400	0.40 0.40 0.40 0.40 0.40	— — — — —	— — — — —
Lubeck ¹	GBTY	—	Turner, Brightman & Co.	300, 600	P G	2000 to 2400	0.40	—	—
Luceric ¹	YHH	155	A. Weir & Co.	300, 600	P G	2000 to 2400	0.40	—	—
Lucerna ¹	MUI	—	Maritime Investments, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lucbana ¹	OCB	150	Clyde Comm. S.S.'s Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lucient ¹	OFS	100	Gas Light & Coke Co.	300, 600	P G	2000 to 2400	0.40	—	—
Lucie Woermann ¹	GBDS	—	New Zealand Ship. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lucigen ¹	EMJ	160	Lucigen S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Luciline ¹	EYP	160	Luciline Nav. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Luga ¹	XKN	135	Bolivian Gen. Enterprise, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Luise Horn	GBKR	—	G. Heyn & Sons	300, 600	P G	2000 to 2400	0.40	—	—
Lumen ¹	MBE	170	Lumen S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lumina ¹	YFC	160	Lumina S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Luneberg ¹	GCVZ	—	British India S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lunka ¹	GLM	200	British India S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lutetian ¹	EYQ	155	Lutetian Nav. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lycaon ¹	YOZ	240	China Mutual S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lydia ¹	VEV	200	L. & S.W. R. Co.	300, 600	P G	2000 to 2400	0.40	—	—
Lynnton Grange ¹	ZEN	130	Houlder Line, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Lynnton	OCU	—	Town Line (London), Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Mabriton ¹	GBEM	—	R. Chapman & Sons	300, 600	P G	2000 to 2400	0.40	—	—
Macedonia MML ¹	MML	230	P. & O. S.N. Co.	300, 600	P G	2000 to 2400	0.40	—	—
Macchard ¹	XIQ	155	Rankin Gilmore & Co.	300, 600	P G	2000 to 2400	0.40	—	—
Macarra ¹	GCYR	—	Austn. United S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Mackay-Bennett ²	MMB	200	Commercial Cable Co.	300, 600	P G	2000 to 2400	0.40	—	—
Mackinaw ¹	YOL	200	Atlantic Transport Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Mackworth ¹	BKO	—	Watergate S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Macoris ¹	LTO	—	Tres, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Macumba ¹	GCYS	—	Austn. United S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Madawaska ¹	BFM	140	Bank Line, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Madras ¹	MSH	250	British India S.N. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Madras City ¹	ZWH	160	St. Just S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Magdala ¹	YGS	145	S.S. Magdala & Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Magdalena ¹	GUC	250	Royal Mail S.P. Co.	300, 600	P G	2000 to 2400	0.40	—	—
Magician ¹	FYZ	170	Charente S.S. Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Magic Star ²	GCTR	—	Blue Star Line, Ltd.	300, 450, 600	P G	2000 to 2400	0.40	—	—
Magnet ²	MEH	140	Eastern Extension, Aust. & China Tel. Co., Ltd.	300, 600	P	2000 to 2400	0.40	—	—
Mahana ¹	LTV	240	Shaw, Savill & Albion Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Mahanada ²	GVJ	130	T. & J. Brocklebank, Ltd.	300, 600	P G	2000 to 2400	0.40	—	—
Mahia ¹	LTV	200	Shaw, Savill & Albion Co., Ltd.	300, 600	P G	2000 to 2400	0.40	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs	
Mahmoudieh ¹ ..	GCMB	—	Khedival Mail S.S. & Graving Dock, Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mahopac ¹ ..	YOM	160	Atlantic Transport Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mahratta ¹ ..	OCM	160	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Mahronda ¹ ..	EKM	180	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Mahru ¹ ..	XFC	140	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Maidan ¹ ..	GVN	130	S.E. & Chatham R. Co. (Managing Committee)	300, 600	P G ..	X	0.40	—	
Maid of Orleans ² ..	ENJ	—	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Malhar ¹ ..	LUQ	210	Well, Ltd. ..	300, 600	P G ..	X	0.40	—	
Maimyo ¹ ..	XJO	123	A. Holt & Co. ..	300, 600	P G ..	X	0.40	—	
Main ¹ ..	GBKS	—	Mandy Ship Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mandy Abbey ¹ ..	EOP	145	Mandy Ship Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mandy Court ¹ ..	EPC	130	Mandy Ship Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mandy Dene ¹ ..	VJL	135	Mandy Ship Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mandy Manor ¹ ..	EPB	150	Mandy Ship Co., Ltd.	300, 600	P G ..	X	0.40	—	
Majestic BEX ¹ ..	BEX	135	W. H. Cockburn & Co. ..	300, 600	P G ..	X	0.40	—	
Makalla ¹ ..	ESA	155	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Malabar ¹ ..	YYG	105	Zapata S.S. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Malakuta ² ..	MRX	200	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Malakuta ² ..	GVI	130	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Malancia ¹ ..	XJP	125	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Malantian ¹ ..	EML	170	Ellerman Lines, Ltd.	300, 600	P G ..	X	0.40	—	
Malayan ¹ ..	ESC	200	Burns, Philp & Co., Ltd. ..	300, 600	P G ..	X	0.40	—	
Maldonad ¹ ..	MJB	170	Harris & Dixon, Ltd.	300, 600	P G ..	X	0.40	—	
Maldard ¹ ..	EIZ	—	General S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Malta ¹ ..	GKD	230	P. & O. S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Mavern Range ¹ ..	ZGC	180	P. & O. S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Matwa ¹ ..	MMD	250	P. & O. S.N. Co., Ltd.	300, 600	P G ..	X	0.40	—	
Manam ¹ ..	GKE	200	Shaw, Savill & Albion Co., Ltd.	300, 600	P G ..	X	0.40	—	
Manan ¹ ..	LUR	200	T. & J. Brocklebank, Ltd.	300, 600	P G ..	X	0.40	—	
Manavi ¹ ..	GVO	170	Pacific S.N. Co.	300, 600	P G ..	X	0.40	—	
Manchester Brigade ¹ ..	EKW	155	Manchester Lines, Ltd.	300, 600	P G ..	X	0.40	—	
Manchester City ¹ ..	GKII	100	Manchester Lines, Ltd.	300, 600	P G ..	X	0.40	—	
Manchester Civilian ¹ ..	ZGV	125	Manchester Lines, Ltd.	300, 600	P G ..	X	0.40	—	

Manchaster Corporation ¹ Manchaster Division ¹ ..	YYB ELZ	155 140	Manchaster Liners, Ltd. Manchaster Liners, Ltd. ..	.. ..	300, 600 300, 600	P G P G	.. ..	2000 to 2200 0700 to 2300 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40 0.40	—
Manchaster Exchange ¹	ZQW	170	Manchaster Liners, Ltd. ..	..	300, 600	P G	..	2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40	—
Manchaster Hero ¹ .. Manchaster Importer ¹	ZBE ZQY	170 170	Manchaster Liners, Ltd. Manchaster Liners, Ltd. ..	.. ..	300, 600 300, 600	P G P G	.. ..	0700 to 2300 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200	0.40 0.40	—
Manchaster Mariner ¹ ..	ZQZ	170	Manchaster Liners, Ltd. ..	..	300, 600	P G	..	1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800	0.40	—
Manchaster Merchant ¹	ZQL	165	Manchaster Liners, Ltd. ..	..	300, 600	P G	..	2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800	0.40	—
Manchaster Port ¹ ..	ZQN	160	Manchaster Liners, Ltd. ..	..	300, 600	P G	..	2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800	0.40	—
Manchaster Shipper ¹ ..	ZOF	160	Manchaster Liners, Ltd. ..	..	300, 600	P G	..	2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800	0.40	—
Manchurian Prince ¹ .. Manco ¹ .. Mandala ¹ ..	ETV GOZ YTJ	— 200 230	Furness, Withy & Co., Ltd. Booth S.S. Co., Ltd. British India S.N. Co., Ltd.	.. .. ..	300, 600 300, 600 300, 600	P G P G P G	.. .. ..	2000 to 2200 X X 0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200 0600 to 0800 0900 to 1200 1400 to 1800	0.40 0.40 0.40	—
Mandalay ² ..	GWP	150	Burma S.S. Co., Ltd. ..	..	300, 600	P G	..	2000 to 2200 1000 to 1200 1600 to 1800 2000 to 2200	0.40	—
Manhattan ¹ Manica ¹ Manitou ¹ Manora ¹ Manilla ¹ Mantua ¹ Manx Isles ¹ Manxman ³ Manzanara ¹ Maple ¹ .. Maple Branch ¹ Mapleleaf ¹	GKK YZI ZWZ GIT YHJ MME LTR GPS MLS MSP ZIV EYB	250 — 250 230 180 190 170 150 150 — 200	Atlantic Transport Co., Ltd. Ellerman & Bucknall S.S. Co., Ltd. Atlantic Transport Co., Ltd. British India S.N. Co., Ltd. H. E. Moss & Co., Ltd. .. P. & O. S.N. Co. . . . Manx Isles S.S. Co., Ltd.. Midland Ry. Co. . . . Elders & Fyffes, Ltd. . Laird Line, Ltd. . . . Nautilus S.S. Co., Ltd. British Tanker Co. . . .	.. .. .. .. .. .. .. .. .. .. .. .. ..	300, 600 300, 600 300, 600 300, 600 300, 600 300, 600 300, 400, 600 ²⁴ 300, 600 300, 600 300, 600 300, 600 300, 600	P G P G P G P G P G P G P G P G P G P G P G P G	.. .. .. .. .. .. .. .. .. .. .. .. ..	0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40 0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Frans.	Frans.	
Maplemore ¹	ZND	170	Johnston Line, Ltd.	300, 600	P G	X	0.40	—	
Mapleton ¹	XHD	—	Canadian Northern S. Ships, Ltd.	300, 600	P G	X	0.40	—	
Marathon ¹	MGJ	220	G. Thompson & Co., Ltd.	300, 600	P G	X	0.40	—	
Maraval ¹	GWH	100	Trinidad Shipping & Trading Co., Ltd.	300, 450, 600	P G	N	0.40	—	
Marchioness of Bute ¹	YCK	145	Redcroft S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Marconi ¹	ZBC	230	Lampert & Holt, Ltd.	300, 600	P G	X	0.40	—	
Mardinian ¹	GBWN	—	Ellerman's Lines, Ltd.	300, 600	P G	X	0.40	—	
Marengo ¹	GKJ	125	Ellerman's Wilson Line, Ltd.	300, 600	P G	0800 to 1300 1400 to 1700 1800 to 2200	0.40	—	
Maresfield ¹	YQK	140	Woodfield S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Margha ¹	BOY	170	British India S.N. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Maria de Larrinaga	EMA	170	Maria de Larrinaga S.S. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Marie Rose YEH ¹	YEH	170	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Marie Therese ¹	YHV	140	Hudson's Bay Co., Ltd.	300, 600	P G	X	0.40	—	
Markburg	GBVP	—	A. Crawford & Co.	300, 600	P G	X	0.40	—	
Markwood ¹	EKO	105	H. A. Brightman & Co.	300, 600	P G	X	0.15 ²¹	1.50 ²¹	
Marmora ¹	MMR	250	P. & O. S.N. Co.	300, 600	P G	X	0.40	—	
Marnetown ¹	GAX	—	Town Line (London), Ltd.	300, 600	P G	X	0.40	—	
Maronion ¹	EMN	150	Ellerman Lines, Ltd.	300, 600	P G	X	0.40	—	
Marquesa ¹	ZQD	150	Furness, Houlder & Argentine Lines, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Marsden ¹	BJJ	105	Burnett S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Marshall Haig ¹	YLW	—	Marshall Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Martaban ¹	GWC	140	Brit. & Burmese S.N. Co., Ltd.	300, 600	P G	1000 to 1200 1600 to 1800 2000 to 2200	0.40	—	
Marwarri ¹	ZZZ	—	T. & J. Brocksbank, Ltd.	300, 600	P G	X	0.40	—	
Mary Horlock ¹	GBNZ	170	F. W. Horlock	300, 600	P G	X	0.40	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Meneaus ¹	BET	135	Ocean S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Menevian ¹	XEZ	200	O. & W. Williams & Co.,	300, 800	P G	X	0.40	—	
Menominee ¹	MNE	250	Atlantic Transport Co., Ltd.	300, 800	P G	X	0.40	—	
Mentor ¹	YOA	180	Ocean S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Mercedes BLF	BLF	—	H. Rees, Jones & Co.	300, 800	P G	X	0.40	—	
Mercedes de Larrinaga ¹	EJN	200	Miguel de Larrinaga S.S. Co., Ltd.	300, 800	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Merchant ¹	EIG	155	Charente S.S. Co., Ltd.	300, 800	P G	0600 to 0800	0.40	—	
Merchant Prince ¹	ZFU	170	Prince Line	300, 800	P G	0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Mercian ¹	VVT	170	F. Leyland & Co., Ltd.	300, 800	P G	N	0.40	—	
Mercuria ¹	YTM	150	Donaldson Line, Ltd.	300, 800	P G	N	0.40	—	
Merganser ¹	GCTL	—	Cork S.S. Co., Ltd.	300, 800	P G	N	0.40	0.50 ²⁰	
Meron ¹	MJM	—	International Nav. Co., Ltd.	300, 800	P G	X	0.40	—	
Merkara ¹	GMV	225	British India S.N. Co., Ltd.	300, 800	P G	X	0.40	—	
Mersey ¹	MWJ	135	Oceanic S.N. Co., Ltd.	300, 800	P G	X	0.40	—	
Mesaba ¹	EOV	—	Atlantic Transport Co., Ltd.	300, 800	P G	X	0.40	—	
Mesopotamia ¹	EVA	155	Westminster Shipping Co., Ltd.	300, 800	P G	X	0.40	—	
Messina ¹	ZFK	155	Gulf Line, Ltd.	300, 800	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Metagama ¹	YZQ	240	Canadian Pacific Rly. Co.	300, 800	P G	N	0.40	—	
Metor ¹	GBSP	—	Royal Mail Steam Packet Co.	300, 800	P G	X	0.40	—	
Methven ¹	YLZ	175	Canadian Pacific Railway Co.	300, 800	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Mexican Prince ¹	YJH	150	Prince Line	300, 800	P G	X	0.40	—	
Mexico MWG ¹	MWG	170	Pacific S.N. Co.	300, 800	P G	X	0.40	—	
Michael ¹	GWV	—	Booth S.S. Co., Ltd.	300, 800	P G	X	0.40	—	
Michigan ¹	TKM	220	Atlantic Transport Co., Ltd.	300, 800	P G	X	0.40	—	

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Ship Stations—Continued.

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Morocco ¹ ..	ZVU	210	Ellerman's Wilson Line, Ltd.	300, 600	P G	0900 to 1300 1500 to 1800 2000 to 2300	0.40	—	
Mortlake ¹ ..	YNE	145	British S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Morvada ¹ ..	MUP	230	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Motagua ¹ ..	MPN	230	Elders & Fyffes, Ltd.	300, 600	P G	X	0.40	—	
Moto ¹ ..	GDBS	170	Pelton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mottisfont ¹ ..	YFL	170	Canadian Pacific Ocean Services, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Mount Berwyn ¹ ..	BBM	150	Sefton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mount Etna ¹ ..	YNK	155	Sefton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mount Everest ¹ ..	XLN	150	Sefton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mount Snowdon ¹ ..	EZO	150	Sefton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mourino ¹ ..	BNK	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	0900 to 1300 1500 to 1800 2000 to 2300	0.40	—	
Mull ¹ ..	GXM	130	Istes S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Mumbles Light ¹ ..	YTD	150	German Bros.	300, 600	P G	X	0.40	—	
Munard ¹ ..	GOP	180	Crossburn S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Muncaster Castle ¹ ..	ZAX	160	Lancashire Ship Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Muneric ¹ ..	XIL	180	Crossburn S.S. Co., Ltd.	300, 600	P G	X	0.40	0.50 ¹⁰	
Munster ¹ ..	MCQ	170	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05 ¹⁰	—	
Murillo ¹ ..	YTH	220	Lampport & Holt, Ltd.	300, 600	P G	N	0.40	—	
Muristan ¹ ..	GCZW	170	Strick Line, Ltd.	300, 600	P G	N	0.40	—	
Musican ¹ ..	MAD	170	Charente S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Mutlah ¹ ..	MOA	145	James Nourse, Ltd.	300, 600	P G	X	0.40	—	
Muttra ¹ ..	GMJ	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Myrmidon ¹ ..	ZKK	170	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Mytilus ¹ ..	ZKU	200	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Nagara ¹ ..	L7Z	200	Royal Mail Steam Packet Meat Transports, Ltd.	300, 600	P G	X	0.40	—	
Nagoya ¹ ..	GDD	220	P. & O. S.N. Co.	300, 600	P G	X	0.40	—	
Nalmes ¹ ..	GBLX	—	Bank Line, Ltd.	300, 600	P G	X	0.40	—	

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Mini- Radio- tele- gram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Newquay ¹	BDK	120	Newcastle S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
New Texas ¹	GCLW	—	Elder, Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	
Newton GBTJ ¹	GBTJ	—	Lampport & Holt, Ltd.	300, 600	P G	X	0.40	—	
New Toronto ¹	GCLV	200	Elder, Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	
New York City ¹	BQU	145	C. Hill & Sons	300, 600	P G	X	0.40	—	
Nagakuta	BHP	—	Blackball Coal Co., Ltd.	300, 600	P G	X	0.40	—	
Niagara ⁹	GBE	250	Union S.S. Co. of New Zealand, Ltd.	300, 600	P G	—	—	—	
Niceto de Larrinaga ¹	ZNS	170	Miguel de Larrinaga S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
						0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Nicoya ¹	MLV	150	Elders & Fyffes, Ltd.	300, 600	P G	X	0.40	—	
Nichroy	GBRF	—	Royal Mail S.P. Co., Ltd.	300, 600	P G	X	0.40	—	
Nienburg ¹	GBYS	—	I. Chambers & Co.	300, 600	P G	X	0.40	—	
Nikaristan ¹	EKN	145	Portloe S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Nile GCVV ¹	GCVV	—	Glen & Co.	300, 600	P G	X	0.40	—	
Nilemede ¹	XJM	150	D. & T. G. Adams	300, 600	P G	X	0.40	—	
Nina (La) ¹	BGI	140	H. M. Grayson	300, 600	P G	X	0.40	—	
Ningchow ¹	VOV	200	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ninlan ¹	MEB	170	F. Leyland & Co., Ltd.	300, 600	P G	X	0.40	—	
Ninive ¹	GCWP	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Nirvana ¹	MZW	270	British India S.N. Co., Ltd.	300, 600	P G	N	0.40	—	
Nitokris ¹	GBZS	—	Pacific S.N. Co.	300, 600	P G	X	0.40	—	
Nitonian ¹	YSD	170	F. Leyland & Co., Ltd.	300, 600	P G	X	0.40	—	
Nivose ¹	YMX	150	Pissson S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
						0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Nizam ³	YBC	—	Asiatic S.N. Co., Ltd.	300, 600	P G	X	—	—	
Noelle ¹	YLC	130	P. Samuel & Co., Ltd.	300, 600	P G	X	0.40	—	
Nollemsent ¹	GVO	120	P. Samuel & Co., Ltd.	300, 600	P G	X	0.40	—	
Norburn ¹	XID	210	P. O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Norfolk Range ¹	GKV	210	Neptune S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Norman ¹	BUG	200	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Normanville ¹	GBW	175	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Normandy ¹	GBW	175	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Normanville GKV ¹	GBW	175	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Normanville GBLK ¹	GBLK	175	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Normanville GBLK ¹	GBLK	175	Union Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	

	GBLK	T. L. Duff & Co.	P G	N	0.40
Normannia	..	Prince Line	P G	0800 to 1200	0.40
Norman Prince ¹	145		P G	1400 to 1500	0.40
				1800 to 2400	
Normanstar ¹	..	Blue Star Line, Ltd.	P G	X	0.40
Norriston ¹	120	Norrison S.S. Co., Ltd.	P G	X	0.40
Norseman ¹	140	Western Telegraph Co.	P	—	—
North Britain ¹	140	North Ship Co., Ltd.	P G	0600 to 0800	0.40
				0900 to 1200	
				1400 to 1800	
				2000 to 2200	
Northern ¹	..	J. Mathias & Sons..	P G	—	0.40
Northern Coast ¹	130	Coast Line, Ltd.	P G	X	0.05 ^{1a}
North Pacific ¹	ZSK	Felix S.S. Co., Ltd.	P G	X	0.40
Northland ¹	200	International Nav. Co., Ltd.	P G	N	0.40
North Point ¹	170	Norfolk & N. American S.S. Co., Ltd.	P G	X	0.40
				X	0.40
North Sands ¹	145	Union Chartering Co.	P G	0600 to 0800	0.40
Northumberland ¹	180	Federal S.N. Co., Ltd.	P G	0900 to 1200	0.40
				1400 to 1800	
				2000 to 2200	
North Western Miller ¹	MTV	Norfolk & N. American S.S. Co., Ltd.	P G	0600 to 0800	0.40
Norton ¹	140	Furness, Withy & Co., Ltd.	P G	0900 to 1200	0.40
				1400 to 1800	
				2000 to 2200	
Nortonian ¹	MEO	F. Leyland & Co., Ltd.	P G	N	0.40
Norwich City ¹	EXB	St. Just S.S. Co., Ltd.	P G	X	0.40
Notanda ¹	145	Gordon S.S. Co., Ltd.	P G	X	0.40
Nottingham ¹	XCFZ	Great Central Railway	P G	X	0.40
Novara ¹	200	P. & O. S.N. Co.	P G	X	0.40
Novgorod ZOG ¹	ZCG	Royal Mail Steam Packet Co.	P G	N	0.40
Novian ¹	250	F. Leyland & Co., Ltd.	P G	N	0.40
Novington ¹	YPG	Southdown S.S. Co., Ltd.	P G	X	0.40
Novo ¹	ELM	Ellerman's Wilson Line, Ltd.	P G	X	0.40
Nowshera ¹	OCK	British India S.N. Co., Ltd.	P G	X	0.15 ²¹
Nubia ¹	ENQ	F. Leyland & Co., Ltd.	P G	N	0.40
Nucula ¹	ZGO	Anglo-Saxon Petro. Co., Ltd.	P G	X	0.40
Nuddea ¹	BHL	British India S.N. Co., Ltd.	P G	X	0.40
Nurturton ¹	GBTW	Carlson S.S. Co., Ltd.	P G	X	0.40
Nyanza ¹	ZVH	P. & O. S.N. Co.	P G	X	0.40
Oak Branch ¹	GKY	Nautilus S.S. Co., Ltd.	P G	0600 to 0800	0.40
	ETC			0900 to 1200	
				1400 to 1800	
				2000 to 2200	
Oakfield ¹	MXF	Doughty Shipping Co., Ltd.	P G	0600 to 0800	0.40
Oaklands Grange	ZEQ	Houlder Line	P G	X	0.40
Oakmore ¹	BOP	Johnson Line, Ltd.	P G	0900 to 1200	0.40
				1400 to 1800	
				2000 to 2200	
Oakwin ¹	XLD	Ashwin & Co.	P G	X	0.40
Oanfa ¹	GTL	China Mutual S.N. Co., Ltd.	P G	X	0.40
Obra ¹	GML	British India S.N. Co., Ltd.	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Ocean Monarch ¹	EXR	150	Monarch S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Ocean Transport ¹	ZDZ	140	Empire Transport Co., Ltd.	300, 600	P G	X	0.40	—	
Oehringen ¹	GBPF	130	Lyle Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Okara ¹	GMW	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Oliva ¹	ZLO	210	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Olympia ¹	MHI	175	Henderson Bros. (Anchor Line)	300, 600	P G	X	0.40	—	
Olympic ¹	MKC	400	White Star Line	300, 600	P G	N	0.40	—	
Olympos ¹	GBNS	—	Thos. Law & Co.	300, 600	P G	X	0.40	—	
Onda ¹	GNL	200	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Onega ¹	GCFD	—	Wm. Thompson & Co.	300, 600	P G	X	0.40	—	
Onitsha ¹	ZMM	175	Brit. & African S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Onwen	EPJ	135	Woolston S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Onward ²	GUM	50	S.E. & Chatham Railway Co.'s Mng. Committee	300, 600	P G	N	0.15	1.50	
Oolobaria ¹	NRU	200	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Opawa ¹	MRG	220	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Ophir GYB ¹	GYB	200	Orient S.S. Co.	300, 600	P G	X	0.40	—	
Orangeleaf ¹	ZZP	210	Lane & Macandrew, Ltd.	300, 600	P G	X	0.40	—	
Orangemoor ¹	VIL	145	Moor Line, Ltd.	300, 600	P G	X	0.40	—	
Orange River ¹	ZEM	160	Brit. Empire S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Oranian ¹	ZGU	175	F. Leyland & Co., Ltd.	300, 600	P G	N	0.40	—	
Orari ¹	KRM	240	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Orator ¹	YNB	220	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Orbita ¹	MGI	240	Pacific S.N. Co.	300, 600	P G	N	0.40	—	
Orcia ¹	MGO	240	Pacific S.N. Co.	300, 600	P G	N	0.40	—	
Orcoma ¹	MJF	280	Pacific S.N. Co.	300, 600	P G	N	0.40	—	
Orduna ¹	MGP	280	Pacific S.N. Co.	300, 600	P G	N	0.40	—	
Oreland ¹	BAS	140	Hazlewood Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Orestes ¹	VTN	175	Ocean S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Oriana ¹	MJI	230	Pacific S.N. Co.	300, 600	P G	X	0.40	—	
Orient City ¹	ZUN	150	St Just S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Orissa ¹	GNW	210	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Oristano ¹	ZFL	160	Gulf Line, Ltd.	300, 600	P G	X	0.40	—	
						0600 to 0800			
						0900 to 1200			
						1400 to 1800			
						2000 to 2200			

Orna ¹	GNV	220	British India S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Orontes ¹	MOZ	220	Orient S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Orotava	GUD	220	Royal Mail S.P. Co.	300, 600	P G	1400 to 1800	0.40
Orsova ¹	MOF	280	Orient S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Ortega ¹	MJK	220	Pacific S.N. Co.	300, 600	P G	1400 to 1800	0.40
Orteric ¹	GBTW	—	Bank Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Orthia ¹	YUT	160	Donaldson Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Oruba	GUE	250	Royal Mail S.P. Co.	300, 600	P G	1400 to 1800	0.40
Orvietto ¹	MOJ	250	Orient S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Osiris ¹	GAQ	155	P. & O. S.N. Co.	300, 600	P G	1400 to 1800	0.40
Osterley ¹	MOY	250	Orient S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Othello ¹	YNT	240	Ellerman's Wilson Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Otira ¹	XFD	180	Shaw, Savill & Albion Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Ottawa ¹	MIV	180	Anglo-American Oil Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Otto Kalthoff	GBYV	—	Andrew Crawford & Co.	300, 600	P G	1400 to 1800	0.40
Overdale ¹	BUY	145	Chr. Salvesen & Co.	300, 600	P G	1400 to 1800	0.40
Owenee ¹	YLB	135	Anglo-Saxon Pet. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Oxfordshire ¹	MYE	210	Bibby S.S. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Oxonian ¹	MHR	190	F. Leyland & Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Oyleric ¹	YPE	190	Bank Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Ozarda ¹	GNZ	140	British India S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Pacific Transport ¹	ZED	145	Empire Transport Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Pacuare ¹	MLY	150	Elders & Fyffes, Ltd.	300, 600	P G	1400 to 1800	0.40
Paignton ¹	GCZV	—	Lord Glanely	300, 600	P G	1400 to 1800	0.40
Pakeba ¹	GLG	250	Shaw, Savill & Albion Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Pak Ling ¹	ZIN	170	China Mutual S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Palamcotta ¹	BSP	230	British India S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Palermo ¹	MIL	180	P. & O. S.N. Co.	300, 600	P G	1400 to 1800	0.40
Palitana ¹	ZSQ	170	British India S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Palma MKD ¹	MKD	170	P. & O. S.N. Co.	300, 600	P G	1400 to 1800	0.40
Palma YMG ¹	YMG	155	British & African S.N. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Palmas (Las) ¹	GBVM	—	R. Mackill & Co.	300, 600	P G	1400 to 1800	0.40
Palm Branch ¹	EWG	175	Nautilus S.S. Co. Ltd.	300, 600	P G	1400 to 1800	0.40
Panama MWB ¹	MWB	170	Pacific S.N. Co.	300, 600	P G	1400 to 1800	0.40
Panama Transport ¹	ZDV	160	Empire Transport Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Panayiotis ¹	YXM	125	Grahams & Co.	300, 600	P G	1400 to 1800	0.40
Pancras ¹	MDI	155	Booth S.S. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Pangani ¹	GBZN	150	Glen Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Pangbourne ¹	OCL	150	Power S.S. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Pannonia ¹	MNA	250	Cunard S.S. Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Papara ¹	MHY	230	New Zealand Shipping Co., Ltd.	300, 600	P G	1400 to 1800	0.40
Paraguay (El) ¹	GCSP	250	Houlder Line, Ltd.	300, 600	P G	1400 to 1800	0.40
Parana ¹	GLK	150	Royal Mail Steam Packet Co.	300, 600	P G	1400 to 1800	0.40
Pardo ¹	GLL	150	Royal Mail Steam Packet Co.	300, 600	P G	1400 to 1800	0.40
Paris GLC ¹	GLC	120	L.B. & S.C. Railway Co.	300, 600	P G	1400 to 1800	0.15 ¹⁸
Parktown ¹	ZVF	150	Town Line (London), Ltd.	300, 600	P G	1400 to 1800	0.40
Parthenia ¹	ZXJ	170	Donaldson Line, Ltd.	300, 600	P G	1400 to 1800	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Pasha ¹	MZZ	200	Asiatic S.N. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Patani ¹	ZIL	200	African S.S. Co. ..	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Patella ¹	MZO	170	Anglo-Saxon Petro. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Pathan ¹	MFV	140	Mogul S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Patmos ¹	GBZF	—	James Cormack & Co. ..	300, 800	P G ..	X	0.40	—	
Patricia ¹	GBZP	—	Ellerman Lines, Ltd. ..	300, 800	P G ..	X	0.40	—	
Patriotic ¹	BDI	140	Charente S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Patriotic ¹	LSM	150	Belfast S.S. Co., Ltd. ..	300, 800	P G ..	X	0.05 ²⁰	0.50 ²⁰	
Patrol ¹	MEM	140	E. Extension Austr. & China Tel. Co., Ltd. ..	300, 800	P ..	X	0.40	—	
Patuca ¹	GDB	200	Elders & Fyffes, Ltd. ..	300, 800	P G ..	X	0.40	—	
Paul Palx ¹	YGP	145	Leonardo Carrying Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Pavia ¹	ZZV	170	Cunard S.S. Co., Ltd. ..	300, 800	P G ..	N	0.40	—	
Pearla ¹	ZZO	210	Laue & MacAndrew, Ltd. ..	300, 800	P G ..	X	0.40	—	
Pearlmoor ¹	VIM	145	Moor Line, Ltd. ..	300, 800	P G ..	X	0.40	—	
Pebbles ¹	QDB	145	Sutherland S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Peleus ¹	YPO	240	Ocean S.S. Co. Ltd. ..	300, 800	P G ..	X	0.40	—	
Pembroke ¹	BDI	—	Great Western Railway Co. ..	300, 800	P G ..	N	0.40	—	
Pembroke ¹	YUT	200	Royal Mail Steam Packet Co. ..	300, 800	P G ..	N	0.40	—	
Pemnaire ¹	YFM	110	Penare S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Pencil ¹	BNY	140	Hopkins, Sanders & Co. ..	300, 800	P G ..	X	0.40	—	
Pendarvis ¹	YHB	150	Pendarvis S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Penden ¹	XFI	135	Penden S.S. Co., Ltd. ..	300, 800	P G ..	X	0.40	—	
Pendennis ¹	GBLS	—	Everett & Newbigin ..	300, 800	P G ..	X	0.40	—	
Pendragon Castle ¹	ZZF	150	Lancashire Shipping Co., Ltd. ..	300, 800	P G ..	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Pengelly ¹	VLX	120	Pencisely Shipping Co. ..	300, 800	P G ..	X	0.40	—	
Pengreep ¹	EWR	110	Pengreep S.S. Co. ..	300, 800	P G ..	X	0.40	—	
Penmorvah ¹	ZXN	200	Penmorvah S.S. Co. ..	300, 800	P G ..	X	0.40	—	
Pennant ¹	XFH	125	Penmount S.S. Co. ..	300, 800	P G ..	X	0.40	—	
Pennant ¹	ZZC	150	Swansea Livers, Ltd. ..	300, 800	P G ..	X	0.40	—	

Pennyworth ¹	ZPL	180	Dalglish S.S. Co., Ltd.	300, 600	P G	0000 to 0000	0.40
Pennolver ¹	YXT	170	Pennolver S.S. Co.	300, 600	P G	0900 to 1200	0.40
Pennhos ¹	YKW	145	Richard S.S. Co.	300, 600	P G	1400 to 1800	0.40
Pennhyd ¹	EXY	140	Ferrier & Rees	300, 600	P G	2000 to 2200	0.40
Pennhys ¹	MXH	—	Sidney Rees Nav. Co., Ltd.	300, 600	P G	X	0.40
Pennrose ¹	ZWU	155	Pennrose S.S. Co.	300, 600	P G	X	0.40
Pennsacola ¹	OED	120	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800	0.40
						0900 to 1200	
						1400 to 1800	
						2000 to 2200	
Pennsiva ¹	YMZ	140	Pennsiva S.S. Co.	300, 600	P G	X	0.40
Pentakota ¹	ZSN	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40
Pentaur ¹	GOV	180	Chr. Salvesen & Co., of Leith	300, 600	P G	X	0.40
Pennian ¹	YKW	145	Mitchell S.S. Co., Ltd.	300, 600	P G	X	0.40
Pera ¹	GBCY	—	Ball, Symondson & Co. . . .	300, 600	P G	X	0.40
Perez ¹	BQZ	130	British Hispano Line, Ltd.	300, 600	P G	X	0.40
Persian Prince ¹	XIZ	150	Prince Line, Ltd.	300, 600	P G	X	0.40
Persic ¹	MQC	250	Oceanic S.N. Co., Ltd. . . .	300, 600	P G	X	0.40
Perth ¹	EWG	130	Dundee, Perth & London Shipping Co.	300, 600	P G	X	0.40
						0.50 ²⁰	
Perthshire ¹	GOB	220	Scottish Shire Line, Ltd. . .	300, 450, 600	P G	0900 to 1230	0.40
						1300 to 1400	
						1600 to 1800	
						2000 to 0100	
Peru GLN ¹	GLN	220	Pacific S.N. Co.	300, 600	P G	N	0.40
Peshawar ¹	GCBS	165	P. & O. S.N. Co.	300, 600	P G	X	0.40
Petersham ¹	ETZ	160	Britain S.S. Co., Ltd.	300, 600	P G	X	0.40
Peterston ¹	YGV	—	R. Chapman & Son	300, 600	P G	X	0.40
Petingaudet ¹	BFV	170	Bolivian Gen. Enterprise, Ltd.	300, 600	P G	X	0.40
Petrograd ¹	BUF	105	W. Thompson & Co.	300, 600	P G	X	0.40
Petrolene ¹	ZYK	160	Saxoline S.S. Co., Ltd. . . .	300, 600	P G	X	0.40
Petworth ¹	XIH	150	Power Co. S.S. Co., Ltd. . .	300, 600	P G	X	0.40
Peweril ¹	XKK	130	C.A. Stewart & Co.	300, 600	P G	X	0.40
Phidias ¹	YOT	200	Liverpool, Brazil and River Plate S.N. Co., Ltd.	300, 600	P G	X	0.40
Philadelphia ¹	GCMJ	—	F. Leyland & Co., Ltd. . . .	300, 600	P G	X	0.40
Phoebe ¹	OCN	140	Bede S.S. Co., Ltd.	300, 600	P G	X	0.40
Phrygia ¹	EST	170	Cunard S.S. Co., Ltd.	300, 600	P G	X	0.40
Phrysa ¹	EVW	190	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40
Pecton ¹	YFA	—	E. T. Radcliffe & Co.	300, 600	P G	X	0.40
Piako ¹	GBYP	—	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40
Pikepool ¹	YLV	140	Pool S.S. Co., Ltd.	300, 600	P G	X	0.40
Pilar de Larrinaga ¹	BHF	—	Miguel de Larrinaga S.S. Co., Ltd.	300, 600	P G	X	0.40
Pilton ¹	GDBP	135	Lord Glanely	300, 600	P G	X	0.40
Pinar del Rio ¹	GCNJ	—	Santa Clara S.S. Co., Ltd. . .	300, 600	P G	X	0.40
Pinemoor ¹	ZJO	135	Johnston Line, Ltd.	300, 600	P G	0600 to 0800	0.40
						0900 to 1200	
						1400 to 1800	
						2000 to 2200	
Pinewin ¹	GBX	150	Ashwin & Co.	300, 600	P G	X	0.40
Pinnau ¹	GBPY	—	Gellatly, Hankey & Co. . . .	300, 600	P G	X	0.40
Pioner CBFJ	GBFJ	—	J. M. Campbell & Son	300, 600	P G	X	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Plassy ¹	MNJ	250	P. & O. S.N. Co., Ltd.	300, 600	P G	N	0.40	—	—
Plata (La) GBKF ¹	GBKF	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	—
Plauen ¹	GBND	—	Watts, Watts & Co., Ltd.	300, 600	P G	X	0.40	—	—
Plumleaf ¹	ZIM	210	Lane & MacAndrew, Ltd.	300, 600	P G	X	0.40	—	—
Plutarch ¹	ZIB	155	L'pool Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Polbain ¹	BLH	170	Coast Lines, Ltd.	300, 600	P G	X	0.40	—	—
Polcrest ¹	BOH	135	L. Lougher & Co.	300, 600	P G	X	0.40	—	—
Poldennis ¹	BFY	—	Fisher, Alimonda & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—
Poleric ¹	GCY	210	A. Weir & Co.	300, 600	P G	N	0.40	—	—
Polglass Castle ¹	ZTA	160	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Polgowan ¹	ZIZ	—	Farrer Groves & Co., Ltd.	300, 600	P G	X	—	—	—
Policastria ¹	ZAF	170	Farrer, Groves & Co., Ltd.	300, 600	P G	X	0.40	—	—
Polish Monarch ¹	EJC	145	Raeburn & Verel, Ltd.	300, 600	P G	X	0.40	—	—
Pollitician ¹	MVZ	155	Charente S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Polladern ¹	ZMH	220	J. Herron & Co.	300, 600	P G	X	0.40	—	—
Pollensa ¹	XHS	145	J. Cory & Sons, Ltd.	300, 600	P G	X	0.40	—	—
Polo ¹	GBNJ	125	Ellerman's Wilson Lines, Ltd.	300, 600	P G	X	0.40	—	—
Polperro ¹	BFZ	150	Fisher Alimonda & Co.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—
Polshannon ¹	XUK	230	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	—
Poltolia ¹	ZWA	—	Anning Bros.	300, 600	P G	X	0.40	—	—
Polycarp ¹	XIE	140	Booth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Polyphenus ¹	VSZ	170	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Pomaron ¹	OEI	125	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—
Pontwen ¹	YDR	—	W. & C. T. Jones S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Poona ¹	MSO	190	P. & O. S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Poplar Branch ¹	YFP	160	Nautilus S. Shipping Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—

Porsanger ¹	YBW		Furness Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	—
Porta ¹	..	GBTN	Lampart & Holt, Ltd.	300, 600	P G	X	—
Portfield ¹	..	GCBF	W. E. Hinde & Co.	300, 600	P G	X	0.40
Port Adelaide ¹	..	GCNR	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Albany ¹	..	GWI	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Alma ¹	..	EQB	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Augusta ¹	..	EPN	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Bowen ¹	..	XHP	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Caroline ¹	..	XHQ	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Chalmers ¹	..	EJW	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Curtis ¹	..	GCFJ	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Darwin ¹	..	YGL	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Denison ¹	..	YGM	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Elliot ¹	..	ZLT	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Portfield ¹	..	GCBF	W. E. Hinde & Co.	300, 600	P G	X	0.40
Port Hacking ¹	..	EIP	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Portinglis ¹	..	MXN	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40
Port Kembla ¹	..	GCNQ	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Lincoln ¹	..	GTZ	Commonwealth & Dominion Line, Ltd.	300, 600	P G	N	0.40
Portloe ¹	..	EKN	W. E. Hinde & Co.	300, 600	P G	X	0.40
Port Lyttelton ¹	..	ZPD	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Macquarie ^{1, 2}	..	GSB	Commonwealth & Dominion Line, Ltd.	300, 600	P G	N	0.40
Port Melbourne ¹	..	ZSW	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Napier ¹	..	ZNZ	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Nicholson ¹	..	XHO	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Phillip ¹	..	EPO	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Port Pirie ¹	..	ZSV	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40
Portreath ¹	..	MXX	Portloe S.S. Co.	300, 600	P G	X	—
							0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Portsmouth ¹	YPW	145	Portland S.S. Co., Ltd.	300, 600	P G	X	—	—	
Portsmouth ¹	GCYV	—	Portland S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Portsmouth ¹	YOH	135	Sea S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Port Stephens ¹	ZSU	230	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	—	—	
Port Sydney ¹	ZLU	220	Commonwealth & Dominion Line, Ltd.	300, 600	P G	N	0.40	—	
Portuguese Prince ¹	GRS	200	Prince Line, Ltd.	300, 600	P G	N	0.40	—	
Port Victor ¹	EQD	250	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40	—	
Port ¹	GBTN	—	Lampport & Holt	300, 600	P G	X	0.40	—	
Potomac ¹	GLQ	145	Anglo American Oil Co., Ltd.	300, 600	P G	X	0.40	—	
Potosi ¹	MI	170	Pacific S.N. Co., Ltd.	300, 600	P G	0900 to 1100 2000 to 0200	0.40	—	
Prab ¹	ERW	220	Brit. & African S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Prabsu ¹	ZMB	200	African S.S. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Pratral ¹	BAM	135	Plesson S.N. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Pretoria GCYB ¹	GCYB	—	Allen Line S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Pretorian ¹	MFN	200	Ocean S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Priam ¹	VTO	200	A. M. Sutherland	300, 600	P G	X	0.40	—	
Priestfield ¹	BDQ	—	Grand Trunk Pacific Development Co., Ltd.	300, 600	P G	X	0.40	4.00	
Prince George GLR ¹	GLR	130	Grand Trunk Pacific Development Co., Ltd.	300, 600	P G	N	0.40	4.00	
Prince Rupert ¹	GLS	130	Grand Trunk Pacific Development Co., Ltd.	300, 600	P G	N	0.40	4.00	
Princesa ¹	ZQE	130	Furness-Houlder Argentine Line, Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Princess	BJX	—	Ellerman & Bucknall S.S. Co., Ltd.	300, 600	—	X	—	—	
Princess Beatrice	GHWF	—	G.F. Railway Co.	300, 450, 600	P G	X	—	—	1.00 to 2.00

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED KINGDOM—contd.									
Ramsay ¹	YCX	—	Sutherland S.S. Co., Ltd...	300, 600	P G	X	Francs.	—	
Rancey ¹	XKO	200	Asiatic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ranella ¹	MZP	100	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Ranger MLD ²	MLD	150	Liverpool Salvage Association	300, 600	P	X	0.40	—	
Raphael ¹	MET	175	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Rapidan ¹	EQV	180	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1100 2000 to 2200	0.40	—	
Raranga ¹	ZNI	200	Shaw, Savill & Albion Co., Ltd.	300, 600	P G	X	0.40	—	
Rassay ¹	MGR	140	Isles S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Rathlin Head ¹	ZAR	150	Ulster S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Rathmore ¹	GUT	250	L. & N.W. Railway Co.	300, 600	P G	X	0.40	—	
Ravelston ¹	YGV	135	Ravelston S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Raven ¹	LTN	—	General S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ravenrock ¹	GCSY	135	Glover Bros.	300, 600	P G	X	0.40	—	
Ravenshoe ¹	YAT	160	Seville & U.K. Carrying Co., Ltd.	300, 600	P G	X	0.40	—	
Ravenspoint ¹	XFF	135	Sir J. Esplen & Co.	300, 600	P G	X	0.40	—	
Ravensstone ¹	BRZ	145	Chr. Salvesen & Co.	300, 600	P G	X	0.40	—	
Ravensworth ¹	GBJN	170	Dalglish S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Reading ¹	EXK	145	Seville & U.K. Carrying Co., Ltd.	300, 600	P G	X	0.40	—	
Recorder ²	MEJ	140	E. Extension Australian & China Tel. Co., Ltd.	300, 600	P	X	0.40	—	
Redbridge ¹	YHQ	155	Temperley, S.S. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Red Cap ¹	ZRG	130	Red Cap S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Redruth ¹	ZMC	150	Redruth S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Regent ¹	ZGO	145	J. Westall	300, 600	P G	X	0.40	—	
Regina GBCT ¹	GBCT	160	J. & A. Roxburgh	300, 600	P G	X	0.40	—	
Regina ZOD ¹	ZOD	—	British & North Atlantic S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Reims BJP ¹	BJP	150	Union. Shipping & Trading Co., Ltd.	300, 600	P G	X	0.40	—	
Reims MBD ¹	MBD	150	Great Western Railway Co., Ltd.	300, 600	P G	X	0.40	—	
Rembrandt MEU ¹	MEU	125	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	X	0.40	—	

Relilio ¹	XLZ	140	Orders & Handford S.S. Co., Ltd.	300, 600	P	G	0.40
Rembrandt MEU ¹	MEU	160	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 600	P	G	0.40
Remuera ¹	MKV	250	New Zealand S.S. Co., Ltd.	300, 600	P	G	0.40
Renfrew ¹	BFL	125	Sutherland Co., Ltd.	300, 600	P	G	0.40
Reval ¹	MMC	145	Birkdale S.S. Co., Ltd.	300, 600	P	G	0.40
Reval BEB ¹	BBB	120	W. Thomson & Co.	300, 600	P	G	0.40
Rexmore ¹	XHY	150	Johnston Line, Ltd.	300, 600	P	G	0.40
Rheinfels ¹	VDH	—	Grahams & Co.	300, 600	P	G	0.40
Rhenania ¹	GBMC	—	Turnbull Scott Shipping Co., Ltd.	300, 600	P	G	0.40
Rhesus ¹	ZIH	250	China Mutual S.N. Co., Ltd.	300, 600	P	G	0.40
Rho ¹	YHW	135	Orders & Handford S.S. Co., Ltd.	300, 600	P	G	0.40
Rhode Island ¹	BUX	150	White Diamond S.S. Co., Ltd.	300, 600	P	G	0.40
Rhodesian Transport ¹	ZGB	160	Empire Transport Co., Ltd.	300, 600	P	G	0.40
Ridley ¹	BGL	150	Red "R" S.S. Co., Ltd.	300, 600	P	G	0.40
Rimouski ¹	GIZ	230	British & North Atlantic S.N. Co., Ltd.	300, 600	P	G	0.40
Rimutaka ¹	MBT	230	New Zealand Shipping Co., Ltd.	300, 600	P	G	0.40
Rion ¹	XJI	170	Petroleum S.S. Co., Ltd.	300, 600	P	G	0.40
Rio Blanco ¹	YXN	140	Thompson S.S. Co., Ltd.	300, 600	P	G	0.40
Rio Negro GBDW ¹	GBDW	—	Orient S.N. Co., Ltd.	300, 600	P	G	0.40
Rio Negro BGK	BGK	—	Houlder Bros.	300, 600	P	G	0.40
Rio Pardo ¹	GBDQ	—	Orient S.N. Co., Ltd.	300, 600	P	G	0.40
Rio Preto ¹	BAW	160	London American Maritime Trading Co., Ltd.	300, 600	P	G	0.40
Riposto ¹	GCNK	140	J. Glynn & Sons	300, 600	P	G	0.40
Risaldar ¹	MTE	180	Asiatic S.N. Co., Ltd.	300, 600	P	G	0.40
River Araxes ¹²	ZIT	—	America Levant Line, Ltd.	300, 600	P	G	0.40
Riverdale ¹	YMX	150	Plisson S.N. Co., Ltd.	300, 600	P	G	0.40
River Orontes ¹	EVD	150	America Levant Line, Ltd.	300, 600	P	G	0.40
Riverton ¹	BNE	120	Charlton S.S. Co., Ltd.	300, 600	P	G	0.40
Riviera ¹	GUO	50	S.E. & Chatham Railway Co.'s Mng. Comm.	300, 600	P	G	0.40
Roath ¹	ZRJ	170	British S. Shipping Co., Ltd.	300, 600	P	G	0.40
Rochdale ¹	BGU	145	Rochdale S.S. Co., Ltd.	300, 600	P	G	0.40
Rocio ¹	ENC	175	Orders & Handford S.S. Co., Ltd.	300, 600	P	G	0.40
Roda ¹	GBDP	—	Elder Dempster & Co., Ltd.	300, 600	P	G	0.40
Rolsheim YDK	YDK	—	E. R. Newbigin	300, 600	P	G	0.40
Roker ¹	BSO	150	J. Westoll	300, 600	P	G	0.40
Roma ESW ¹	ESW	170	Rowland & Marwood S.S. Co., Ltd.	300, 600	P	G	0.40
Roma GBMW ¹	GBMW	—	O. & W. Williams	300, 600	P	G	0.40
Roman Prince ¹	ZGI	120	Prince Line, Ltd.	300, 600	P	G	0.40
Romeo ¹	ZOP	220	Hall Line, Ltd.	300, 600	P	G	0.40
Romera ¹²	VVI	—	Glasgow United Shipping Co., Ltd.	300, 600	P	G	0.40
Romney MEV	MEV	170	Liverpool, Brazil and River Plate S.N. Co., Ltd.	300, 600	P	G	0.40
Romney YKP ¹	YKP	—	Frango-British S.S. Co.	300, 600	P	G	0.40
Roualee ¹	GCLS	—	Universal S.N. Co., Ltd.	300, 600	P	G	0.40
Rona ¹	VXQ	—	Colonial Sugar Refining Co., Ltd.	—	P	G	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per-Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
Ronan ¹	BQE	145	G. Gibson & Co., Ltd.	300, 600	P G	X	0.05 ²⁰	0.50 ²⁰	Frans.
Rondo OCS ¹	OCS	130	Pelton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Rooke	GAG	130	F. C. Strick & Co., Ltd.	300, 600	P G	X	0.40	—	
Roquelle ¹	XMV	150	Elder Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	
Rosalind ¹	ZFA	150	New York, Newfoundland & Halifax S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Rosarina (La) ¹	GJW	250	Brit. & Argentine S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Rose ¹	MTQ	135	Laird Line, Ltd.	300, 600	P G	X	0.40	—	
Rose Castle ¹	YVW	170	Lewis S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Roseden ¹	YGE	120	Stephens, Sutton & Stephens	300, 600	P G	X	0.40	—	
Rosefield ¹	BND	135	Woodfield S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Roselands ¹	YCB	150	L. Boydgedes	300, 600	P G	X	0.40	—	
Roseleaf ¹	EQC	190	British Tanker Co., Ltd.	300, 600	P G	X	0.40	—	
Roselec ¹	GLY	250	A. Weir & Co.	300, 600	P G	X	0.40	—	
GCZX		—	Robert Stanley Shipping Co., Ltd.	300, 600	P G	X	0.40	—	
Rossall ¹	GBTV	145	James McKelvie & Co.	300, 600	P G	X	0.40	—	
Rossano ¹	ZFM	200	Gulf Line, Ltd.	300, 600	P G	X	0.40	—	
Rossetti ¹	MEY	175	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Rossia YDI ¹	YDI	180	Sefton S.S. Co., Ltd.	300, 600	P G	X	0.40	— ²⁰	
Rosstrevor ¹	YWB	135	L. & N.W. Railway Co.	300, 600	P G	N	0.05 ²⁰	0.50	
Rotenfels ¹	EQY	—	Grahams & Co.	300, 600	P G	X	—	—	
Rothley ¹	EPE	125	Red "R" S.S. Co., Ltd.	300, 600	P G	X	0.40	0.50 ²⁰	
Rotterdam ZOS ¹	ZOS	120	Rankine Line, Ltd.	300, 600	P G	X	0.05 ²⁰	—	
Rouen XEI ¹	XEI	130	Furness, Withy & Co., Ltd.	300, 600	P G	X	0.40	—	
Roulers ¹	GPL	130	Great Eastern Railway Co.	300, 450, 600 ²⁰	P G	X	0.40	—	
Roumelan ¹	ZFG	145	Ellerman Lines, Ltd.	300, 600	P G	X	0.40	—	
Rounton	XFI	130	Hansen S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Rounton Grange ¹	ZER	140	Holder Line, Ltd.	300, 600	P G	X	0.40	—	
Royal George 2RV ¹	ZRV	130	Holder S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Royal Patricia	ZPL	130	Holder S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Royal Victoria	ZPL	130	Holder S.S. Co., Ltd.	300, 600	P G	X	0.40	—	

Ship	Port	Company	Class	Capacity	Speed	Service	Notes
Royal Transport	GLZ	Royal Transport Co., Ltd.	300, 600	130	170	..	..
Ruston Grange	GLZ	Houlder Bros. & Co., Ltd.	300, 600	130	170	..	..
Ruahine	MKA	New Zealand Shipping Co., Ltd.	300, 600	200	170	..	..
Ruapehu	MKB	New Zealand Shipping Co., Ltd.	300, 600	250	170	..	..
Ruapehu	ZXP	Blue Star Line, Ltd.	300, 600	180	170	..	..
Rudesburg	GBJO	Bank Line, Ltd.	300, 600	—	170	..	..
Rugia	GBL	A. Holt & Co., Ltd.	300, 600	—	170	..	..
Runic	MVC	Oceanic S.N. Co., Ltd.	300, 600	250	170	..	..
Rumney	EPJ	Runney S.S. Co., Ltd.	300, 600	135	170	..	..
Ryburn	XHX	Chas. Lowe & Partners, Ltd.	300, 600	145	170	..	..
Ryde	BSN	Kowland & Marwood S.S. Co., Ltd.	300, 600	170	170	..	..
Saba	YAF	Scrutton Sons & Co.	300, 600	170	170	..	..
Sabine	ERF	Scrutton Sons & Co.	300, 600	170	170	..	..
Sabor	GBQW	Royal Mail S.P. Co.	300, 600	—	170	..	..
Sachem	MOL	British Empire S.N. Co., Ltd.	300, 600	175	170	..	..
Sagana River	ZEK	Tres, Ltd.	300, 600	160	170	..	..
Sagua	LTP	C. B. G. Hancock-Bell	300, 600	180	170	..	..
Sahara	MPX	Bel Symondson & Co.	300, 600	180	170	..	..
Sakkarah	GBSN	Donaldson Line, Ltd.	300, 600	—	170	..	..
Salacia	YIV	Imperial Direct Line, Ltd.	300, 600	—	170	..	..
Salaga	ZMU	Imperial Direct Line, Ltd.	300, 600	160	170	..	..
Salamis	GNA	A. Weir & Co.	300, 600	170	170	..	..
Salerno	EUR	Gulf Line, Ltd.	300, 600	170	170	..	..
Salient	EKR	J. Westoll	300, 600	140	170	..	..
Sallust	ZQH	L'pool Brazil & River Plate S.N. Co., Ltd.	300, 600	155	170	..	..
Salvador ZBV	ZBV	Pacific S.N. Co., Ltd.	300, 600	130	170	..	..
Sambre	GCDD	Royal Mail Steam Packet Co.	300, 600	—	170	..	..
Samnanger	XXC	Furness, Withy & Co., Ltd.	300, 600	—	170	..	..
Sampan	EQN	Denaby & Cadeby Main Collieries, Ltd.	300, 600	—	170	..	..
Sanday	ZRM	Isles S. Shpg. Co., Ltd.	300, 600	—	170	..	..
Sangala	GOD	British India S.N. Co., Ltd.	300, 600	175	170	..	..
Santeramo	ZGH	Gulf Line, Ltd.	300, 600	—	170	..	..
Santhia	GOE	British India S.N. Co., Ltd.	300, 600	175	170	..	..
Santille	BFK	Scrutton Sons & Co.	300, 600	175	170	..	..
Sapphires	MHK	Duke of Bedford	300, 600	200	170	..	..
Saranac	EVG	Anglo-American Oil Co.	300, 600	145	170	..	..
Sardinia	GMB	P. & O. S.N. Co., Ltd.	300, 600	220	170	..	..
Sardinian	MDN	Allen Line	300, 600	200	170	..	..
Sargasso	GXD	Scrutton Sons & Co.	300, 600	175	170	..	..
Sarthe	GCDDW	Royal Mail S.P. Co.	300, 600	—	170	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Saskatoon ¹	BPC	—	Canadian Northern S.S., Ltd.	300, 600	P G	X	0.40	—	
Satanta ¹	GTG	125	Standard Transportation Co., Ltd.	300, 600	P	X	—	—	
Saturnia ¹	MBF	250	Donaldson Line, Ltd.	300, 600	P G	X	0.40	—	
Sausenburg ¹	GBNF	200	Donaldson Bros., Ltd.	300, 600	P G	X	0.40	—	
Savan ¹	LTG	200	Scrutton Sons & Co., Ltd.	300, 600	P G	X	0.40	—	
Saxilby ¹	ELW	145	Sir R. Romer & Co., Ltd.	300, 600	P G	X	0.40	—	
Saxofine ¹	LTX	150	Saxoline S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Saxon ¹	MQI	200	Union-Castle Mail S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Saxonia ¹	MSA	230	Canard S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Scaldier ¹	EXI	140	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	X	0.40	—	
Scandinavian ¹	MNC	—	Allan Line S.S. Co.	300, 600	P G		0.40	—	
Scarlet Tower ¹	VWS	135	Limerick S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Scarpa ¹	BUT	145	Isles S. Shpg. Co.	300, 600	P G	X	0.40	—	
Scatwell ¹	VEQ	140	Tempus S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Schildturm ¹	GBRW	—	Turnbull Scott S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Schwarzenfelde ¹	GBVL	—	Gow, Harrison & Co.	300, 600	P G	X	0.40	—	
Schwaben ¹	GBOL	—	F. C. Strick & Co.	300, 600	P G	X	0.40	—	
Schwarzenfels ¹	GBKZ	—	Macvicar Marshall & Co., Ltd.	300, 600	P G	X	0.40	—	
Schwinge ¹	GBKX	—	James Gardiner & Co.	300, 600	P G	X	0.40	—	
Scindia ¹	MHJ	175	Henderson Bros. (Anchor Line)	300, 600	P G	X	0.40	—	
Scipio	ODR	115	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Scotia GBYZ ¹	GBIZ	—	Hall Bros.	300, 600	P G	X	0.40	—	
Scotia GRR ¹	GRR	170	L. & N.W. Railway	300, 600	P G	X	0.40	—	
Scotian ¹	MJN	200	Allan Line S.S. Co., Ltd.	300, 600	P G	X	0.05 ²⁰	0.50 ²⁰	
Scottier ¹	ZRR	155	Lloyd Royal Belge (Gt. Britain), Ltd.	300, 600	P G	N	0.40	—	
Scottish Monarch ¹	ERS	180	Marich S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Scottish Prince ¹	YXV	145	Prinsep Line, Ltd.	300, 600	P G	X	0.40	—	
Scythian ¹	ZGW	155	F. Leyland & Co., Ltd.	300, 600	P G	X	0.40	—	
Seabank ¹	BWU	140	Kestell S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seacrow ¹	ZYG	135	Dover Nav. Co., Ltd.	300, 600	P G	X	0.40	—	
Sealdy ¹	ZYC	200	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Seamew ¹	LSE	160	Seamew S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seapool ¹	ZWC	160	Seapool S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seaspray ¹	ZVU	115	Seaspray S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seaton ¹	BUT	140	Seaton S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seatonville ¹	BUT	140	Seatonville S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Seeförger ¹	—	—	Seeförger S.S. Co., Ltd.	300, 600	P G	X	0.40	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED KINGDOM—contd.									
Silsden ¹	XEK	125	W. H. Kelynaack ..	300, 600	P G	X	0.40	—	Francs.
Silversand ¹	EKA	140	W. P. & T. James	300, 600	P G	X	0.40	—	—
Silvertown ¹	GMD	225	Anglo-American Oil Co.	300, 600	P G	—	0.40	—	—
Simoon ¹	BLP	120	Trident Line, Ltd.	300, 600	P G	X	0.40	—	—
Singapore ¹	YYA	175	Westminster Shipping Co., Ltd.	300, 600	P G	X	0.40	—	—
Siptah ¹	OFX	170	Moss S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Sir Arthur ¹	BKM	120	Cory Colliers, Ltd.	300, 600	P G	X	0.05 ²⁰	0.50 ²⁰	—
Sir Harvey Adamson ¹	MUK	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Sirus ¹ ..	GBRD	175	Royal Mail Steam Packet Co.	300, 600	P G	X	0.40	—	—
Sitra ¹ ..	EOI	170	J. Moss & Co.	300, 600	P G	X	0.40	—	—
Sittang ¹ ..	GRT	170	P. Henderson & Co.	300, 600	P G	—	—	—	—
Sizergh Castle ¹	YCL	140	Pisson S.N. Co., Ltd.	300, 600	P G	—	0.40	—	—
Skegness ¹	EXU	150	English S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Skipton Castle ¹	ETJ	145	Lancashire Shipping Co., Ltd.	300, 600	P G	—	0.40	—	—
Slav ..	YHY	—	Ottoman Line, Ltd.	300, 600	P G	X	0.40	—	—
Slavic Prince ¹	XIV	150	Prince Line, Ltd.	300, 600	P G	—	0.40	—	—
Slieve Bawn ¹	YWC	135	L. & N.W. Railway Co.	300, 600	P G	N	0.05 ²⁰	0.50 ²⁰	—
Slieve Gallion ¹	YWE	135	L. & N.W. Railway Co.	300, 600	P G	N	0.05 ²⁰	0.50 ²⁰	—
Slievevora ¹	YWF	135	L. & N.W. Railway Co.	300, 600	P G	N	0.05 ²⁰	0.50 ²⁰	—
Smolensk ¹	ODS	125	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.15 ²¹	1.90 ²¹	—
Snaefell ¹	MCS	140	Isle of Man S.P. Co., Ltd.	300, 600	P G	—	0.40	—	—
Snowdon ¹	YWG	135	L. & N.W. Railway Co.	300, 600	P G	N	0.05 ²⁰	0.50 ²⁰	—
Socrates ¹	ZHZ	160	Liverpool, Brazil & River S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Sofala ¹ ..	GOH	160	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Sofia ¹ ..	GBNL	—	Morel, Ltd.	300, 600	P G	X	0.40	—	—
Soldier Prince ¹	ZFW	190	Prince Line, Ltd.	300, 600	P G	—	0.40	—	—
0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200									
0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200									
0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200									
0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200									
0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200									

Ship	Company	Port	Days	Time	Rate	Remarks
Solfels ¹	H. Rogers & Sons	—	—	—	—	—
Solingen ¹	Easton Greig Co.	—	—	—	—	—
Somali MIW ¹	P. & O. S.N. Co., Ltd.	230	—	—	—	—
Somersby ¹	Sir R. Ropner & Co., Ltd.	150	—	—	—	—
Somerset ¹	Federal S.N. Co., Ltd.	150	—	—	—	—
Somme GBQV ¹	Royal Mail Steam Packet Co.	200	—	—	—	—
Sonnenfels ¹	Thos. Law & Co.	—	—	—	—	—
Sorata ¹	Pacific S.N. Co., Ltd.	210	—	—	—	—
Soroka ¹	Ellerman's Wilson Line, Ltd.	—	—	—	—	—
Sorrento ¹	Ellerman's Wilson Line, Ltd.	115	—	—	—	—
Solero ¹	Atlantic & Eastern S.S. Co., Ltd.	145	—	—	—	—
Soudan ¹	P. & O. S.N. Co., Ltd.	200	—	—	—	—
Southern XEV ¹	Frates, Ltd.	175	—	—	—	—
Southern Coast ¹	Coast Lines, Ltd.	140	—	—	—	—
Southingate ¹	Turnbull, Scott S.S. Co.	175	—	—	—	—
Southlea ¹	J. Muers & Co.	140	—	—	—	—
South Pacific ¹	Countess Warwick S.S. Co., Ltd.	160	—	—	—	—
Southport ¹	Sefton S.S. Co., Ltd.	155	—	—	—	—
South Stack ¹	L. & N.W. Railway Co.	135	—	—	—	—
South-Western Miller ¹	Norfolk & N. American S. Shpg. Co., Ltd.	190	—	—	—	—
Spartan Prince ¹	Prince Line, Ltd.	—	—	—	—	—
Spectator ¹	Charente S.S. Co.	170	—	—	—	—
Spermina ¹	A. W. Small	170	—	—	—	—
Spezia ¹	Houlder, Middleton & Co., Ltd.	—	—	—	—	—
Spheroid ¹	Scrutton Sons & Co., Ltd.	175	—	—	—	—
Spilaby ¹	Sir R. Ropner & Co., Ltd.	—	—	—	—	—
Stagpool ¹	Pool Shipping Co., Ltd.	130	—	—	—	—
Stanbul ¹	I. Westoll	—	—	—	—	—
Stanley Hall ¹	Hall Line, Ltd.	160	—	—	—	—
Stanmore ¹	Johnston Line, Ltd.	140	—	—	—	—
Starlight ¹	E. P. Martin	—	—	—	—	—
Start Point ¹	Norfolk & N. American S.S. Co., Ltd.	200	—	—	—	—
Statesman ¹	Charente S.S. Co.	170	—	—	—	—
Staveley ¹	Great Central Railway	—	—	—	—	—
Steigerwald ¹	A. Holt & Co.	—	—	—	—	—
Stellina ¹	Stella Shipping Co., Ltd.	170	—	—	—	—
Stentor ¹	Ocean S.S. Co., Ltd.	170	—	—	—	—
Stephen ¹	Eastern Telegraph Co.	—	—	—	—	—
Stephen ¹	Booth S.S. Co., Ltd.	170	—	—	—	—
Stockport ¹	Great Central Railway	—	—	—	—	—
Stockwell ¹	T. & J. Brocklebank, Ltd.	225	—	—	—	—
Stork ¹	General S.N. Co., Ltd.	—	—	—	—	—
Strabo ¹	Liverpool, Brazil & River Plate S.N. Co., Ltd.	160	—	—	—	—
Strathern ¹	Shankland & Co.	—	—	—	—	—
Strathlin ¹	Anglo-American Oil Co., Ltd.	170	—	—	—	—
Strathlone ¹	Strathlone S.S. Co., Ltd.	170	—	—	—	—
Stroma ¹	Isles S. Shpg. Co., Ltd.	190	—	—	—	—
Strombus ¹	Anglo-Saxon Petro. Co., Ltd.	180	—	—	—	—
Stromness ¹	Lettrichaux Line, Ltd.	170	—	—	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge. Per Word. Mini- mum per Radio- gram.	Remarks.
UNITED KINGDOM—contd.								
Student¹	ZXG	170	Charente S.S. Co., ..	300, 800	P G	X	Francs. 0.40	
Sudbury¹	EJV	155	Alexander Co., ..	300, 800	P G	X	0.40	
Suevic¹	MJC	230	Oceanic S.N. Co., Ltd.	300, 800	P G	X	0.40	
Sufolk¹	GRV	300	Potter, Trinder & Gwyn ..	300, 800	P G	0900 to 1230 1300 to 1400 1600 to 1800 2000 to 2200	0.40	
Sumatra XUF	XUF	—	British India S.N. Co., Ltd.	300, 800	P G	X	—	
Sunbank¹	GCYN	—	Sun Shipping Co., Ltd.	—	—	—	—	
Sunfield¹	CCYL	—	Sun Shipping Co., Ltd.	—	—	—	—	
Sunik¹	YEA	170	Oil Transport Co., Ltd.	300, 600	P G	X	0.40	
Suncleiff¹	GCYM	120	Sun Shipping Co., Ltd.	300, 600	P G	X	0.40	
Sunland¹	ZET	120	Sun Shipping Co., Ltd.	300, 600	P G	X	0.40	
Sunningdale¹	ZFO	115	Lambton & Hutton Collieries, Ltd.	300, 600	P G	X	0.40	
Sunpath¹	GCMZ	140	Sun Shipping Co., Ltd.	300, 600	P G	X	0.40	
Surray¹	BAN	150	Seasbrick S.S. Co., Ltd.	300, 600	P G	X	0.40	
Surada¹	GOI	150	British India S.N. Co., Ltd.	300, 400	P G	X	0.40	
Surat¹	VJX	130	Petroleum S.S. Co., Ltd.	300, 600	P G	X	0.40	
Sussex¹	CCPQ	—	Bank Line, Ltd.	300, 600	P G	X	0.40	
Susquehanna¹	GCBJ	180	Federal S.N. Co., Ltd.	300, 600	P G	X	0.40	
Sussex¹	ERG	—	Union-Castle Mail S.S. Co., Ltd..	300, 600	P G	X	0.40	
Sussex¹	MVS	240	Federal S.N. Co., Ltd.	300, 600	P G	X	0.40	
Sutherland¹	GOC	150	Sutherland S.S. Co., Ltd...	300, 600	P G	X	0.40	
Sutherland Grange¹	GMM	180	Houlder Line, Ltd.	300, 600	P G	X	0.40	
Sutton Hall¹	GWL	115	James Nourse, Ltd.	300, 600	P G	X	0.40	
Sutcliffe¹	ZIG	130	Ellerman Lines, Ltd.	300, 600	P G	X	0.40	
Suvarice¹	GMO	130	A. Weir & Co.	300, 600	P G	X	0.40	
Suwanee¹	MIV	160	Singapore American Oil Co., Ltd.	300, 600	P G	X	0.40	
Swaiby¹	ZVC	160	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	
Swakopmund¹	GBFY	—	Ellerman & Bucknall Co., Ltd.	300, 600	P G	X	0.40	
Swansea¹	MAV	160	Plymouth & London Co., Ltd.	300, 600	P G	X	0.40	
Sweetthorne¹	MDR	140	Lyons Bell & Co., Ltd.	300, 600	P G	X	0.40	
Swineburne¹	RDR	160	London & River Plate S.S. Co., Ltd.	300, 600	P G	X	0.40	
Switzerland¹	XLS	—	Switzerland S.S. Co., Ltd.	300, 600	P G	X	0.40	
Sweden¹	GMP	—	Sweden S.S. Co., Ltd.	300, 600	P G	X	0.40	
Syria (C.M.P.)¹	GHSF	—	Syria S.S. Co., Ltd.	300, 600	P G	X	0.40	
Syrian Prince¹	GHSF	—	Syrian Prince S.S. Co., Ltd.	300, 600	P G	X	0.40	

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Tainui ¹	MWF	200	Shaw, Savill & Albion Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tairoa ¹	GCZN	—	Shaw, Savill & Albion Co., Ltd. ..	300, 600	P G	X	0.40	—	
Takada ¹	MOR	230	British India S.N. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Talithybis ¹	GSH	155	Ocean S.S. Co., Ltd. ..	300, 450, 600	P G	X	0.40	—	
Talune ¹	GBVK	—	Union S.S. Co. of New Zealand, Ltd.	300, 600	P G	X	0.40	—	
Tamaqua ¹	ZBG	180	Furness, Withy & Co., Ltd. ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Tamar ¹	MPG	170	Royal Mail Steam Packet Co. ..	300, 600	P G	X	0.40	—	
Tamarac ¹	ZIC	150	Anglo-American Oil Co. ..	300, 600	P G	X	0.40	—	
Tambov ZOA ¹	ZOA	—	Royal Mail Steam Packet Co. ..	300, 600	P G	N	0.40	—	
Tanfield ¹	ZNU	150	British India S.N. Co., Ltd. ..	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
Tannenbergl ¹	GBXR	—	Phillips, Phillips & Co. ..	300, 600	P G	X	0.40	—	
Tantah ¹	EMZ	160	Khedival Mail S.S. & Graving Dock Co., Ltd.	300, 600	P G	X	0.40	—	
Tapton ¹	ZUG	170	Batheaston Trading Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tara ¹	GMO	225	British India S.N. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tarasay ¹	OCV	150	Sutherland S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tarantia ¹	YRB	—	Penderson Bros. (Anchor Line) ..	300, 600	P G	X	—	—	
Tarbert ¹	YRM	—	Limerick S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tarboia ¹	GMR	225	British India S.N. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tartar Prince ¹	ZLY	150	Prince Line, Ltd. ..	300, 600	P G	X	0.40	—	
Tasmania ¹	GBPS	—	F. & W. Ritson ..	300, 600	P G	X	0.40	—	
Tasmanian Transport ¹	ZEE	135	Empire Transport Co., Ltd. ..	300, 600	P G	X	0.40	—	
Tatarax ¹	GSK	140	Tank Storage & Carriage Co., Ltd.	300, 600	P	X	0.40	—	
Taxandrier ¹	OFF	150	Lloyd Royal Belge (Gt. Britain) Ltd.	300, 600	P G	X	0.40	—	
Teenkaj ¹	YPP	160	China Mutual S.N. Co., Ltd. ..	300, 600	P G	X	0.45	—	
Teesbridge ¹	VOX	140	North of England S. Shpg. Co. ..	300, 600	P G	X	0.40	—	
Teespool ¹	VGK	180	Pool Shipping Co. ..	300, 600	P G	X	0.40	—	
Teesta ¹	GMT	210	British India S.N. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Telesias ¹	ZIZ	225	Ocean S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	
Telamon ¹	ZKA	210	Ocean S.S. Co., Ltd. ..	300, 600	P G	X	0.40	—	

Ship	MCJ	140	Telegraph Construction & Insur. Co.	300, 800	P	..	X	—
Telconia ²	..	140	Co.	300, 800	..	..	..	..
Telemachus ¹	..	180	Ocean S.S. Co., Ltd.	300, 800	P G	..	X	0.40
Telesfora de Larrinaga ¹	..	130	Miguel de Larrinaga S.S. Co. ..	300, 800	P G	..	X	0.40
Tenasserim	..	130	Burnah S.S. Co. ..	300, 800	P G	..	1000 to 1200 1600 to 1800 2000 to 2400	0.40
Tennyson ¹	..	250	Liverpool Brazil & River Plate S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tentenden ¹	..	150	Furness, Withy & Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tento ¹	—	Furness, Withy & Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tern ²	..	—	General S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Teucer ¹	145	Ocean S.S. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Teutonic ¹	..	160	Oceanic S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Teviot ¹	..	200	Royal Mail Steam Packet Co.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tewkesbury ¹	..	120	Alexander S.S. Co.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thamesmede ¹	..	115	Mede Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thamesmede ¹	..	250	G. Thompson & Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thermistocles ¹	..	180	Anglo-Saxon Petro. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thermidor ¹	..	225	Ocean S.S. Co.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thesepus ¹	..	—	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thesip ¹	..	160	D. McIver Sons & Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thessaly ¹	..	180	Johnstone Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thistlemore ¹	..	—	—	—	—	—	—	—
Thistletoer ¹	..	130	Albyn Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thongwa ¹	..	210	British India S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thorpe Grange ¹	..	230	Houlder Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thurland Castle ¹	..	150	Lancashire Shipping Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thurso ¹	..	—	Ellerman's Wilson Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thysa ¹	140	J. Edgar & Co.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Thiara ¹	150	Hall Bros. S.S. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tibermede ¹	..	150	Mede Line, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tiberton	..	—	R. Chapman & Son	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tilly Russ ¹	..	—	Cairns Noble & Co.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tintern Abbey ¹	..	120	Melrose Abbey Shipping Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tintoretto ¹	..	180	Liverpool, Brazil & River Plate S.N. Co., Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Titan GSO ¹	..	170	Ocean S.S. Co., Ltd.	300, 450, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40
Tiverton ¹	..	140	Associated Oil Carriers, Ltd.	300, 800	P G	..	0600 to 0800 0900 to 1200 1400 to 1800	0.40

Trevanion ¹	YCI	130	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevarack ¹	GOM	190	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trewaylor ¹	YGG	130	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevela ¹	GCBN	140	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevelan ¹	XLK	170	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevelyan ¹	GBRX	—	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Treverbryn ¹	GCBP	150	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevesta ¹	BGR	150	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevelthoe ¹	ZUH	140	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevider ¹	OBF	115	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevilley ¹	YIW	130	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevinock ¹	YRX	105	Fairfield S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevisa ¹	ZGR	120	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevose ¹	XKD	150	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trevellard ¹	GIE	130	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Treveldden ¹	BMT	130	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Treywyl ¹	GCMW	150	Hain S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Triden ZWXX ¹	ZWX	160	Bear Creek Oil & Shipping Co., Ltd.	300, 600	P G	..	..	0.40	—
Trincoto ¹	ENM	150	Donaldson Line, Ltd.	300, 600	P G	..	..	0.40	—
Trintonia ¹	ZNP	130	Prinze Line, Ltd. ...	300, 600	P G	..	..	0.40	—
Trojan Prince ¹	XLS	140	S. Rees Nav. Co., Ltd.	300, 600	P G	..	..	0.40	—
Trojan ..	EXY	175	Oceanic S.N. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tropel ¹	GDU	110	Normandy Shipping Co., Ltd.	300, 600	P G	..	..	0.40	—
Trostan	EJL	130	Prinze Line, Ltd. ...	300, 600	P G	..	..	0.40	—
Troutpool ¹	YJK	130	Johnston Line, Ltd.	300, 600	P G	..	..	0.40	—
Tudor Prince ¹	XMZ	200	Allan Line S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tullamore ¹	MTN	200	Felix S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tunisian ¹	VCS	200	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tunstall ¹	ZNA	200	Dominion Line	300, 600	P G	..	..	0.40	—
Turbo ..	GCPB	150	Hindustan S. Shpg. Co., Ltd.	300, 600	P G	..	..	0.40	—
Turcoman ¹	BNG	150	T. C. Strick & Co.	300, 600	P G	..	..	0.40	—
Turkistan ¹	GVY	140	Prinze Line, Ltd. ...	300, 600	P G	..	..	0.40	—
Tuscan Prince ¹	YJG	180	D. MacIvers Sons & Co., Ltd.	300, 600	P G	..	..	0.40	—
Tuscan ¹	ZKR	200	Anglo-American Oil Co., Ltd.	300, 600	P G	..	..	0.40	—
Tuscarora ¹	EYE	150	Rome S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tusculum ¹	ERK	150	Albany S.N. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tweeddale ¹	YKC	150	British S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Twickenham ¹	EWS	150	Portloe S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Twilight ¹	BMN	130	Ocean S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tydeus ¹	ZIM	160	Bank Line, Ltd.	300, 600	P G	..	..	0.40	—
Tymeric ¹	GBJX	160	Ocean S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tyndareus ¹	ZKC	170	Royal Mail Steam Packet Co.	300, 600	P G	..	..	0.40	—
Tyne ..	GAM	130	Canute S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tynede ¹	BBQ	100	Burnett & Co.	300, 600	P G	..	..	0.40	—
Tynemede ¹	EYX	175	Cunard S.S. Co., Ltd.	300, 600	P G	..	..	0.40	—
Tynemouth ¹	ZBW	175	Morel, Ltd.	300, 600	P G	..	..	0.40	—
Tyria ¹	GBPC	180	British India S.N. Co., Ltd.	300, 600	P G	..	..	0.40	—
Uhlenhorst ¹	ZPP	180	British India S.N. Co., Ltd.	300, 600	P G	..	..	0.40	—
Ujlina ¹	GOR	180	British India S.N. Co., Ltd.	300, 600	P G	..	..	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.							Francs.	Francs.	
Ula ¹ ..	GOL	160	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ulidia ¹ ..	BGP	130	Cliffe S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Ukster ¹ ..	MCW	175	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05 ²⁰	0.50 ²⁰	
Ulua ¹ ..	BOE	210	Clark & Service ..	300, 600	P G	N	0.40	—	
Ulysses ¹ ..	GBU	280	China Mutual S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Umblotti ¹ ..	GCDJ	—	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Ungeni ¹ ..	BLV	—	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Umona ¹ ..	BLW	—	Bullard, King & Co. ..	300, 600	B G	X	0.40	—	
Umsinga ¹ ..	GBDF	135	Bullard, King & Co. ..	300, 450, 600	P G	X	0.40	—	
Umta ¹ ..	GON	170	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Umtail ¹ ..	ERI	200	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Umtata ¹ ..	GCDF	—	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Unavuma ¹ ..	ZQR	180	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Unavumbi ¹ ..	EVF	—	Bullard, King & Co. ..	300, 600	P G	X	0.40	—	
Unio ¹ ..	ZPX	140	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Upada ¹ ..	GOO	200	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Upminster ¹ ..	XHM	100	J. Hudson & Co., Ltd.	300, 600	P G	X	0.05 ²⁰	0.50 ²⁰	
Urbino ¹ ..	GBWP	—	Ellerman's Wilson Line, Ltd.	300, 600	P G	X	0.40	—	
Urlana ¹ ..	GOP	180	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Ursus ¹ ..	YVR	130	Everett & Newbiggin	—	—	X	—	—	
Usworth ¹ ..	BKV	140	Hopkins, Saunders & Co.	300, 600	P G	X	0.40	—	
Valacia ¹ ..	ZNY	190	Cunard S.S. Co., Ltd.	300, 600	P G	N	0.40	—	
Valdivia ZCM	ZCM	—	H. E. Moss & Co. ..	—	—	X	—	—	
Valdura ¹ ..	YPT	180	Valdura S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Valenore ¹ ..	XKW	150	Johnston Line, Ltd.	300, 600	P G	X	0.40	—	
Valencia GBRT ¹ ..	GBRT	—	Commonwealth & Dominion Line, Ltd.	300, 600	P G	X	0.40	—	
Vale o' Moray ..	BSF	—	J. & J. Flett ..	300, 600	P G	X	0.40	—	
Valiant ¹ ..	GCPV	150	Lord Pirrie ..	300, 600	P G	X	0.40	—	
Vallejo ¹ ..	GRK	170	Anglo-Saxon Petro. Co., Ltd.	300, 600	P G	X	0.40	—	
Valverde ¹ ..	ENA	150	Cunard S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Vancouver ¹ ..	ERY	180	Vancouver S.S. Co., Ltd.	300, 600	P G	X	0.40	—	
Vancouver ¹ ..	GZU	—	Elhot Steam Tug Co., Ltd.	300, 600	P G	X	0.40	—	
Varela ¹ ..	MSR	220	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Vardulia ¹ ..	VXS	240	Cunard S.S. Co. ..	300, 600	P G	X	0.40	—	
Vardulia ¹ ..	ZGN	140	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	
Vasova ¹ ..	XIR	180	Grahams & Co. ..	—	—	X	—	—	
Vaszin ¹ ..	GMZ	250	Liverpool Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	N	—	0.40	

Vasconia ¹	..	ENA	150	Cunard S.S. Co.	300, 600	P G	X	0.40	—
Vasna ¹	..	ZHB	220	British India S.N. Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—
Vauban ¹	..	MJW	250	Liverpool Brazil & River Plate S.N. Co., Ltd.	300, 600	P G	N	0.40	—
Vedic ¹	..	ZNG	160	Oceanic S.S. Co., Ltd.	300, 600	P G	N	0.40	—
Vellavia ¹	..	YYM	150	Cunard S.S. Co.	300, 600	P G	N	0.40	—
Venetian ¹	..	YIB	160	Ellerman Lines, Ltd.	300, 600	P G	N	0.40	—
Venice ¹	..	OEE	130	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—
Vennachar ¹	..	ZHK	170	Vennachar S.S. Co., Ltd.	300, 600	P G	X	0.40	—
Vennonia ¹	..	EYN	150	Cunard S.S. Co., Ltd.	300, 600	P G	N	0.40	—
Victoria de Larrinaga ¹	..	EMF	175	Miguel de Larrinaga S.S. Co.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—
Victorian ¹	..	MVN	200	Allan Line	300, 600	P G	X	0.40	—
Victorian Transport ¹	..	XEN	140	Empire Transport Co.	300, 600	P G	N	0.40	—
Vigo ¹	..	ZVT	160	Ellerman's Wilson Line	300, 600	P G	0600 to 1300 1500 to 1800 2000 to 2300	0.40	—
Viking MCD ¹	..	MCD	140	Amazon Tel. Co.	300, 600	P	X	—	—
Vindelia ¹	..	MXD	150	Cunard S.S. Co.	300, 600	P G	N	0.40	—
Vineleaf ¹	..	EPK	240	British Tanker Co.	300, 600	P G	X	0.40	—
Viper ¹	..	EZL	150	G. & J. Burns, Ltd.	300, 600	P G	X	0.05 ¹⁰	—
Virawa ¹	..	ZSR	210	British India S.N. Co.	300, 600	P G	X	0.40	—
Virgil ¹	..	ZQI	200	Liverpool Brazil & River Plate S.N. Co.	300, 600	P G	X	0.40	—
Virgilia ¹	..	GXB	150	Cunard S.S. Co.	300, 600	P G	N	0.40	—
Virginian ¹	..	MGN	280	Allan Line	300, 600	P G	N	0.40	—
Visigoth ¹	..	BDV	140	Helmisdale S.S. Co.	300, 600	P G	X	0.40	—
Vita ¹	..	MZV	230	British India S.N. Co.	300, 600	P G	X	0.40	—
Vitalia ¹	..	BAR	140	Cunard S.S. Co.	300, 600	P G	N	0.40	—
Vitravia ¹	..	GYS	180	Vitruvia S.S. Co.	300, 600	P G	X	0.40	—
Volga ¹	..	ZIN	—	Volga S.S. Co.	300, 600	P G	N	—	—
Vologda CHN ¹	..	CHN	—	Royal Mail S.P. Co.	300, 600	P G	N	0.40	—
Volumnia ¹	..	GRM	190	Volumnia S.S. Co.	300, 600	P G	X	0.40	—
Volute ¹	..	EYJ	180	Anglo-Saxon Petroleum Co.	300, 600	P G	X	0.40	—
Voronej ¹	..	ZLM	230	Royal Mail S.P. Co.	300, 600	P G	N	0.40	—
Wabana ¹	..	YNL	170	British & Chilian S.S. Co.	300, 600	P G	X	0.40	—
Waddon ¹	..	ZWY	155	Cassar, Ltd. (Malta)	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—
Wahehe ¹	..	GBK	—	Shaw, Savill & Albion Co.	300, 600	P G	X	0.40	—
Waihemo ¹	..	GDRO	—	Union S.S. Co.	300, 600	P G	N	0.40	—
Waikawa ¹	..	GCNY	—	Union S.S. Co.	300, 600	P G	X	0.40	—
Waimana ¹	..	GNE	230	Shaw, Savill & Albion Co.	300, 600	P G	X	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service formed.	Ship Charge.		Hours of Service.	Remarks.
						Per Word.	Minimum per Radio-telegram.		
UNITED KINGDOM—contd.						Francs.	Francs.		
Waimarino ¹	YUS	200	Union S.S. Co.	300, 600	P G	0.40	—	2030 to 0030 0900 to 1030 1200 to 1300 1400 to 1430 1630 to 1700	
Waimate ¹⁰	MOS	110	New Zealand S.S. Co.	300, 600	P G	0.10	—	X	
Waipara ¹⁰	GNK	125	British India S.N. Co.	300, 600	P G	0.40	—	X	
Wairuna ¹	ENL	—	Union S.S. Co.	300, 600	P G	0.40	—	X	
Waitemata ¹	GBNM	—	Union S.S. Co.	300, 600	P G	0.40	—	X	
Waiatomo ¹	VMI	—	Union S.S. Co.	300, 600	P G	0.40	—	X	
Waivera ¹	MRV	210	Shaw, Savill & Albion Co.	300, 600	P G	0.40	—	X	
Waldenburg ¹	GBMQ	—	F. C. Strick & Co.	300, 600	P G	0.40	—	X	
Wallace ¹	MOX	—	English S.S. Co.	300, 600	P G	0.40	—	X	
Walmer Castle ¹	MOH	200	Union Castle Mail S.S. Co.	300, 600	P G	0.40	—	X	
Walham ¹	VFA	—	Thompson S.S. Co.	300, 600	P G	0.40	—	X	
Walton Hall ¹	MTH	150	Ellerman Lines & Co.	300, 600	P G	0.40	—	X	
Wandby ¹	MWX	130	Sir K. Ropner & Co.	300, 600	P G	0.40	—	X	
Wanderer ¹	ZBO	180	Charente S.S. Co.	300, 600	P G	0.40	—	X	
Wangaratta ¹	GBOP	210	British India S.N. Co.	300, 600	P G	0.40	—	X	
War Acouite ¹	ZTW	150	W. Runciman & Co.	300, 600	P G	0.40	—	X	
War Admiral ¹	YUW	—	Furness Withy & Co.	300, 600	P G	0.10	—	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	
War African ¹	OFA	150	Anglo-Saxon Petroleum Co.	300, 600	P G	0.10	—	X	
War Afridi ¹	GCVR	—	C. T. Bowring & Co.	300, 600	P G	0.10	—	X	
War Algoma ¹	XYT	—	Argula S.S. Co.	300, 600	P G	0.40	—	X	
War Anchusa ¹	VXX	150	I. Temperley & Co.	300, 600	P G	0.40	—	X	
War Aravala ¹	VBM	—	British India S.N. Co.	300, 600	P G	0.40	—	X	
War Babine ¹	ZPH	—	Easton, Grieg & Co.	300, 600	P G	0.40	—	X	
War Bahadur ¹	LUN	150	C. T. Bowring & Co.	300, 600	P G	0.40	—	X	
War Begun ¹	XMK	180	British Tanker Co.	300, 600	P G	0.40	—	X	
War Beryl ¹	BMK	170	Canadian Pacific Rly. Co.	300, 600	P G	0.40	—	X	
War Bharat ¹	GCVD	—	British Tanker Co.	300, 600	P G	0.40	—	X	
War Brahmin ¹	GCVS	—	C. T. Bowring & Co.	300, 600	P G	0.40	—	X	
War Breaker ¹	YFB	150	John Black & Co.	300, 600	P G	0.40	—	X	
War Breeze ¹	ERR	150	C. Nielson & Sons	300, 600	P G	0.40	—	X	
War Cariboo ¹	EKE	—	H. Fernie & Sons	300, 600	P G	0.40	—	X	
War Casco ¹	NVA	—	J. Hardie & Co.	300, 600	P G	0.10	—	X	

War Chariot	XVI	—	Racburn & Vêrel...	300, 600	P G	..	0.40
War Cheetah	GCNL	—	Hopkins, Jones & Co.	300, 600	P G	..	0.40
War Chilkat	XYH	—	J. Hardie & Co.	300, 600	P G	..	0.40
War Cloud	GCXZ	—	Limerick S.S. Co.	300, 600	P G	..	0.40
Warcuta	ZJH	—	British India S.N. Co.	300, 600	P G	..	0.40
War Danson	YTD	150	C. T. Bowering & Co.	300, 600	P G	..	0.40
War Diwan	XMM	—	Gow Harrison & Co.	300, 600	P G	..	0.40
War Dogra	GCND	150	Craig Shipping Co.	300, 600	P G	..	0.40
War Down	ENG	160	Union-Castle Mail S.S. Co.	300, 600	P G	..	0.40
War Earl	XXB	—	British India S.N. Co.	300, 600	P G	..	0.40
Warepa	YBU	—	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Expert	BQM	140	British India S.N. Co.	300, 600	P G	..	0.40
Warfield	ERT	200	..	300, 600	P G	..	0.40
War Fiend	XVI	—	E. C. Downing	300, 600	P G	..	0.40
War Fury	XXV	—	F. C. Downing	300, 600	P G	..	0.40
War Gaekwar	XMN	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Gaspe	XXK	—	Glover Bros.	300, 600	P G	..	0.40
War Gurka	OFH	160	Hunting & Son	300, 600	P G	..	0.40
War Gunner	BH	—	Alfred Holt & Co.	300, 600	P G	..	0.40
War Hagara	GBVW	—	Andrew Weir & Co.	300, 600	P G	..	0.40
War Halifax	ZJG	150	Hansen Shipping Co.	300, 600	P G	..	0.40
War Halton	XXS	—	Tyack & Branfoot	300, 600	P G	..	0.40
War Hamlet	BYB	150	Aster Shipping Co.	300, 600	P G	..	0.40
War Hermit	BPW	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Hindoo	GCZK	—	Gow Harrison & Co.	300, 600	P G	..	0.40
War Huron	YTF	—	Glover Bros.	300, 600	P G	..	0.40
Warialda	YZI	—	British India S.N. Co.	300, 600	P G	..	0.40
Warina	XLP	—	British India S.N. Co.	300, 600	P G	..	0.40
War Island	ZRU	150	Owen & Watkin Williams & Co.	300, 600	P G	..	0.40
War Jandoli	ZRP	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Jemadar	OFI	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Jupiter	GCIN	—	Federal S.N. Co.	300, 600	P G	..	0.40
War Karma	XVN	—	Furness Withy & Co.	300, 600	P G	..	0.40
War Khan	LUE	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Kookri	GBRY	180	Lane & Macandrew, Ltd.	300, 600	P G	..	0.40
War Krishna	GCID	—	Dalglish S.S. Co.	300, 600	P G	..	0.40
War Kworth	EIO	—	..	300, 600	P G	..	0.40
Warla	XXD	—	British India S.N. Co.	300, 600	P G	..	0.40
War Magic	XYU	—	E. C. Downing	300, 600	P G	..	0.40
War Magpie	ZMA	150	H. Sammon & Co.	300, 600	P G	..	0.40
War Matane	XXL	—	Glover Bros.	300, 600	P G	..	0.40
War Matron	BQC	150	Anglo-Saxon Petroleum Co.	300, 600	P G	..	0.40
War Mehtar	BTG	—	Hunting & Son	300, 600	P G	..	0.40
War Mingan	BRC	—	Anning Bros.	300, 600	P G	..	0.40
War Mogul	GBXP	—	Anglo-American Oil Co.	300, 600	P G	..	0.40
War Mohawk	YSV	—	Glover Bros.	300, 600	P G	..	0.40
War Moncton	ZTN	—	Hansen Shipping Co.	300, 600	P G	..	0.40
War Nawab	XML	—	British Tanker Co.	300, 600	P G	..	0.40
War Niagara	XXN	—	Glover Bros.	300, 600	P G	..	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED KINGDOM—contd.									
War Nicola ¹ ..	XXQ	—	J. Hardie & Co. ..	300, 600	P G	X	Francs. 0.40	—	
War Nipigon ¹ ..	GVW	—	Anning Bros. ..	300, 600	P G	X	0.40	—	
War Nizam ¹ ..	OFN	—	British Tanker Co. ..	300, 600	P G	X	0.40	—	
War Nookla ¹ ..	EIL	—	Henry Fernie & Sons ..	300, 600	P G	X	0.40	—	
Waroonga ¹ ..	GCX	—	British India S.N. Co. ..	300, 600	P G	X	0.40	—	
Warora ¹ ..	BUL	—	British India S.N. Co. ..	300, 600	P G	X	0.40	—	
War Ottawa ¹ ..	XXM	—	Glover Bros. ..	300, 600	P G	X	0.40	—	
War Pathan ¹ ..	GBCM	145	Andrew, Weir & Co. ..	300, 600	P G	X	0.40	—	
War Patriot ¹ ..	BPY	150	Anglo-Saxon Petroleum Co. ..	300, 600	P G	X	0.40	—	
War Peridot ¹ ..	YJM	200	Canadian Pacific Ocean Services, Ltd. ..	300, 600	P G	X	0.40	—	
War Pilot ¹ ..	BHD	—	Furness, Withy & Co. ..	300, 600	P G	0660 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
War Prince ¹ ..	BCL	—	Furness, Withy & Co. ..	300, 600	P G	0660 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	
War Pundit ¹ ..	BOR	150	Stephens, Sutton & Stephens ..	300, 600	P G	X	0.40	—	
War Pyramid ¹ ..	EUB	160	R. W. I. Sutherland & Sons ..	300, 600	P G	X	0.40	—	
War Quebec ¹ ..	XXU	—	Anning Bros. ..	300, 600	P G	X	0.40	—	
War Racoon ¹ ..	MYU	—	Jas. Robinson & Sons ..	300, 600	P G	X	0.40	—	
War Radnor ¹ ..	YIH	—	Anning Bros. ..	300, 600	P G	X	0.40	—	
War Rajah ¹ ..	OFK	145	British Tanker Co. ..	300, 600	P G	X	0.40	—	
War Rajput ¹ ..	OFM	150	Anglo-Saxon Petroleum Co. ..	300, 600	P G	X	0.40	—	
War Rane ¹ ..	OFL	150	Anglo-Saxon Petroleum Co. ..	300, 600	P G	X	0.40	—	
War Recruit ¹ ..	BHA	—	Alfred Holt & Co. ..	300, 600	P G	X	0.40	—	
Warrior ¹ ..	YMI	—	British & African S.N. Co. ..	300, 600	P G	X	0.40	—	
War Sapper ¹ ..	ZPO	—	Charente S.S. Co. ..	300, 600	P G	X	0.40	—	
War Seneca ¹ ..	BHK	—	Alfred Holt & Co. ..	300, 600	P G	X	0.40	—	
War Sepoy ¹ ..	YXA	—	Glover Bros. ..	300, 600	P G	X	0.40	—	
War Shikari ¹ ..	OCF	145	Anglo-Mexican Petroleum Co. ..	300, 600	P G	X	0.40	—	
War Sikh ¹ ..	OFJ	140	Hunting & Son ..	300, 600	P G	X	0.40	—	
War Sioux ¹ ..	YQR	140	British Tanker Co. ..	300, 600	P G	X	0.40	—	
War Sky ¹ ..	ZQP	—	Anning Bros. ..	300, 600	P G	X	0.40	—	
War Smilax ¹ ..	ZDX	150	Hartlepool Seaton S.S. Co. ..	300, 600	P G	X	0.40	—	
	GCNP	—	Taten S.N. Co. ..	300, 600	P G	X	0.40	—	

War Soldier ¹	BBW	—	Furness Withy & Co.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—
War Songhee ¹	BTE	—	Henry Fernie & Sons	300, 600	—	—	—	—
War Sorel ¹	BST	—	Anning Bros.	300, 600	P G	X	0.40	—
War Spray ¹	XJX	150	R. W. J. Sutherland & Sons	300, 600	P G	X	0.40	—
War Subadar ¹	OFG	120	Anglo-Saxon Petroleum Co.	300, 600	P G	X	0.40	—
War Sudra ¹	GCYF	—	British India S.N. Co.	300, 600	P G	X	0.40	—
War Sumas ¹	XXG	—	John Cook & Son	300, 600	P G	X	0.40	—
War Suquash ¹	—	—	J. Hardie & Co.	300, 600	P G	X	0.40	—
War Swan ¹	VVC	150	E. Bigland & Co.	300, 600	P G	X	0.40	—
War Tanco ¹	XVO	—	J. Hardie & Co.	300, 600	P G	X	0.40	—
War Taurus ¹	XXT	—	Tyack & Branfoot	300, 600	P G	X	0.40	—
War Tauris ¹	XXT	—	Lyle Shipping Co.	300, 600	P G	X	0.40	—
Warburg ¹	GBTR	—	Hansen Shipping Co.	300, 600	P G	X	0.40	—
War Toronto ¹	ZSV	—	Owen & Watkin Williams & Co.	300, 600	P G	X	0.40	—
War Toronto ¹	ZZX	145	Grahams & Co.	300, 600	P G	X	0.40	—
Warturn	BLY	—	Alfred Holt & Co.	300, 600	P G	—	—	—
War Veteran ¹	BHE	—	Bibby S.S. Co.	300, 600	P G	X	0.40	—
Warwickshire ¹	MYO	250	Furness Withy & Co.	300, 600	P G	X	0.40	—
War Witch ¹	XXR	—	London Transport Co.	300, 600	P G	X	0.40	—
War Yukon ¹	EIA	—	Vernco S.S. Co.	300, 600	P G	X	0.40	—
War Zephyr ¹	YFY	150	Great Western Railway Co.	300, 600	P G	X	0.40	—
Waterford ¹	YZY	110	Letricheux Line	300, 600	—	—	—	—
Watness ¹	YLE	—	Charente S.S. Co.	300, 600	P G	X	0.40	—
Wayfarer ¹	GCI	250	North of England S.S. Co.	300, 600	P G	X	0.40	—
Wearbridge ¹	EKI	—	Weardale S.S. Co.	300, 600	P G	X	0.40	—
Wearpool ¹	BTU	130	Pool Shipping Co.	300, 600	P G	X	0.40	—
Wearpool ¹	ERU	140	Constantine & Pickering S.S. Co.	300, 600	P G	X	0.40	—
Wearwood ¹	BUD	140	Wm. France Fenwick & Co.	300, 600	P G	X	0.40	—
Wedgwood ¹	LUD	—	Retritution S.S. Co.	300, 600	P G	X	0.40	—
Wedgwood ¹	VZL	160	H. Hogarth & Sons	300, 600	P G	X	0.40	—
Wedgwood ¹	GBQK	—	Bank Line, Ltd.	300, 600	P G	X	0.40	—
Weissenfels ¹	GBDK	—	Dendholm Line Steamers, Ltd.	300, 600	P G	X	0.40	—
Wellpark ¹	XEA	130	C. Hill & Sons	300, 600	P G	X	0.40	—
Wells City ¹	BQV	150	British & North Atlantic S.N. Co., Ltd.	300, 600	P G	X	0.40	—
Welshman ¹	GCPC	240	T. C. Steven & Co.	300, 600	P G	X	0.40	—
Weltdale ¹	GXXK	115	The Dalgleish S.S. Co., Ltd.	300, 600	P G	X	0.40	—
Wentworth ¹	GBCN	170	Hazlewood Shipping Co., Ltd.	300, 600	P G	X	0.40	—
Westborough ¹	BDJ	140	Cliffside S.S. Co., Ltd.	300, 600	P G	X	0.40	—
Westcliff ¹	EUD	150	J. Mathias & Sons	300, 600	P G	X	0.40	—
Western ¹	OFB	—	Cleaves Valleys Anthracite Col- lieries, Ltd.	300, 600	P G	X	0.40	—
Western Valleys ¹	GCYK	135	Westwick S.S. Co., Ltd.	300, 600	P G	X	0.40	—
Westhope ¹	XKKX	100	Union S.S. Co. of New Zealand, Ltd.	300, 600	P G	X	0.40	—
Westmeath ¹	MJQ	190	Federal S.N. Co., Ltd.	300, 600	P G	X	0.40	—
Westmoreland ¹	ZBM	180	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	—
Whakatane ¹	MRI	180	Hansen Shipping Co., Ltd.	300, 600	P G	X	0.40	—
Whateley Hall ¹	EZW	140	Cork S.S. Co., Ltd.	300, 600	P G	X	0.40	—
Whimbrei ¹	YGO	120	S. S. Whinfield Co., Ltd.	300, 600	P G	X	0.40	—
Whinfield ¹	BQF	150	—	300, 600	P G	X	0.40	—

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED KINGDOM—contd.									
Whitby Abbey ¹	GCBK	120	Hull & Netherlands S.S. Co., Ltd.	300, 600	P G	X	0.05 ¹⁰	0.50 ¹⁰	Frans.
Whitwood ¹	XFR	120	W. France Fenwick & Co.	300, 600	P G	X	0.40	—	—
Wignore ¹	EQH	140	Johnston Line, Ltd.	300, 600	P G	X	0.40	—	—
Wilhelm Hemsoth ¹	GBXM	—	Pentwyn S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Willaston ¹	YCP	160	Wirral Transport Co., Ltd.	300, 600	P G	X	0.40	—	—
Willesden ¹	EVG	140	Britain S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
William Balls ¹	BTF	130	W. D. C. Balls & Sons	300, 600	P G	X	0.40	—	—
William Middleton ¹	XET	150	J. Westoll	300, 600	P G	X	0.40	—	—
Wilton ¹	GTX	155	Wilston S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Wiltshire ¹	GHD	330	Federal S.N. Co., Ltd.	300, 600	P G	0900 to 1230 1300 to 1400 1600 to 1800 2000 to 0100	0.40	—	—
Wimbleton ¹	LUK	160	Lowlands S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Wimborne ¹	EWB	160	Wimborne S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Windhuk ¹	GBFR	—	New Zealand Shipping Co., Ltd.	300, 600	P G	X	0.40	—	—
Winfried ¹	GBWR	—	H. Hogarth & Sons	300, 600	P G	X	0.40	—	—
Wingate ¹	OEJ	120	Furness, Withy & Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—
Winifredian ¹	MFL	250	F. Leyland & Co., Ltd.	300, 600	P G	N	0.40	—	—
Winkfield ¹	OCV	175	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Winnabago ¹	ZAP	150	Anglo-American Oil Co., Ltd.	300, 600	P G	X	0.40	—	—
Winterton ¹	ODI	—	Denaby & Cadeby Main Collieries, Ltd.	300, 600	P G	X	0.40	—	—
W. I. Radcliffe ¹	LSA	145	Wynstay S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—
Wisley ¹	YWX	130	Mitre Shipping Co., Ltd.	300, 600	P G	0600 to 0800 0900 to 1200 1400 to 1800 2000 to 2200	0.40	—	—
Woldingham	BOV	130	John Harrison, Ltd.	300, 600	P G	X	0.40	—	—
Wolfram ¹	GBKQ	—	P. Henderson & Co.	300, 600	P G	X	0.40	—	—
Wolsburg ¹	GBDM	—	Elder Dempster & Co., Ltd.	300, 600	P G	X	0.40	—	—
Wolverton ¹	ODO	—	H. A. Brightman & Co.	300, 600	P G	X	0.40	—	—
Woodarra ¹	GCFK	—	British India S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Woodburn ¹	XMA	140	Maindy Shipping Co., Ltd.	300, 600	P G	X	0.40	—	—
Woodcock ¹	EJB	140	General S.N. Co., Ltd.	300, 600	P G	X	0.40	—	—
Woodfield ¹	YNA	140	Woodfield S.S. Co., Ltd.	300, 600	P G	X	0.40	—	—

Line	Ship	Company	Port of Origin	Port of Destination	Agent	Remarks
140	Woodville ¹	Southern Whaling & Sealing Co.	..	..	XKQ	
140	Worsley Hall ¹	Hall Line, Ltd.	..	..	MDW	
140	Wotan	T. Law & Co.	..	..	GRLW	
140	Wustly Castle ¹	Lancashire Shipping Co., Ltd.	..	..	GOZ	
150	Wyecrag ¹	Wye Shipping Co., Ltd.	..	..	EMV	
150	Wyecrest ¹	Wye Shipping Co., Ltd.	..	..	YOP	
150	Wyecote	Furness, Withy & Co., Ltd.	..	..	ZBI	
200	Wyeric ¹	Bank Line, Ltd.	..	..	MTB	
200	Wyvisbrock ¹	Brook S.S. Co., Ltd.	..	..	ZCS	
185	Yang Tze ¹	China Mutual S.N. Co., Ltd.	..	..	ZKO	
135	Yarborough ¹	Letricheux Line	..	..	YLM	
200	Yaroslavl ¹	Royal Mail Steam Packet Co.	..	..	ZOK	
—	Yildum ¹ YBR..	Furness, Withy & Co., Ltd.	..	..	YBR	
180	Yonne ¹	Equinox S.S. Co., Ltd.	..	..	ZNV	
—	York Castle ¹	Union-Castle Mail S.S. Co., Ltd.	..	..	ERC	
—	Yoseric ¹	A. Weir & Co.	..	..	ZFN	
—	Ypranga ¹	Oceanic S.N. Co., Ltd.	..	..	GBJP	
175	Zaida ¹	British India S.N. Co., Ltd.	..	..	XBI	
130	Zamorá ¹	Turner, Brightman & Co.	..	..	ZVX	
160	Zaria ¹ ..	British & African S.N. Co., Ltd.	..	..	ZMP	
120	Zealand ¹	Leith, Hull & Hamburg S.P. Co., Ltd.	..	..	MTX	
240	Zealandic ¹	Oceanic S.N. Co., Ltd.	..	..	MUZ	
120	Zelo ¹	Pelton S.S. Co., Ltd.	..	..	BCE	
140	Zermatt ¹	Turner, Brightman & Co.	..	..	EUZ	
160	Zero ¹	Turner, Brightman & Co.	..	..	EUH	
160	Zimorodok	Ellerman's Wilson Line, Ltd.	..	..	VEX	
135	Zingara ¹	Turner, Brightman & Co.	..	..	ZXA	
160	Zira ¹ ..	British India S.N. Co., Ltd.	..	..	ZUG	
150	Zuleika ¹	Turner, Brightman & Co.	..	..	EUJ	
140	Zurichmoor ¹	Moor Line, Ltd.	..	..	YIR	
—	AA1 ¹ ..	Navy	..	..	NILB	
—	AA2 ¹ ..	Navy	..	..	NABB	
—	AA3 ¹ ..	Navy	..	..	NABZ	
—	Aaron Ward ¹ ..	Navy	..	..	NELX	

¹ Operated by the Federal Telegraph Company, Hobart Building, San Francisco (Cal.)

² Operated by the Haller - Cunningham Company, 428, Market Street, San Francisco (Cal.)

UNITED STATES OF
AMERICA

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Abangarez *	KDI	—	United Fruit Co. ..	300, 600	P G	N	0.10	—	³ Operated by the Independent Wireless Telegraph Company, 12, Broadway, New York (N.Y.)
Abarenda *	NOB	—	Navy ..	300, 600	P G	N	0.20	—	⁴ Operated by the International Radio Telegraph Company, 326, Broadway, New York (N.Y.)
Abbeville *	KLN	—	U.S. Shipping Board ..	300, 600	P G	N	0.20	—	⁵ Operated by the Radio Corporation of America, Woolworth Building, New York (N.Y.)
Abbot *	NEZS	—	Navy ..	300, 600	P G	N	0.20	—	⁶ Operated by the Ship Owners' Radio Service, 149, Broadway, New York (N.Y.)
Abel P. Upshur *	NUJD	—	Navy ..	300, 600	P G	N	0.20	—	⁷ Operated by the Tropical Radio Telegraph Company, 17, Battery Place, New York (N.Y.)
Aberdeen WXIU *	WXIU	200	U.S. Shipping Board ..	300, 600	P G	N	0.20	—	⁸ Operated by the U.S. Naval Communication Service, Navy Department, Washington (D.C.)
Abianset *	KIXF	250	U.S. Shipping Board ..	300, 600	P G	N	0.20	—	⁹ Private yacht
Abner Coburn *	WHR	250	Libby, McNeill & Libby ..	300, 450, 600, 1800	P G	X	0.20	—	¹⁰ When the ship is trading in the North and South American service
Abraham Lincoln *	KIXS	—	U.S. Shipping Board ..	300, 600	P G	X	0.20	—	¹¹ When the ship is trading in the trans-oceanic service
Abtigada *	KNIE	200	U.S. Shipping Board ..	300, 600	P G	X	0.20	—	
Abtron *	KEBD	—	U.S. Shipping Board ..	300, 600	P G	X	0.20	—	
Absaroka *	WKW	200	U.S. Shipping Board ..	300, 600	P G	X	0.20	—	
Abscon *	KSEA	150	U.S. Shipping Board ..	300, 600	P G	X	0.20	—	
A. C. Redford *	KNZ	300	Standard Oil Co. of N.J. ..	300, 450, 600	P G	X	0.20	—	
Achilles *	KPT	500	Panama R.R. Co. ..	300 450, 600	P G	N	0.40	—	
Acme *	KIJ	150	Standard Transportation Co. ..	300, 600	P G	X	0.20	—	
Acrema *	KEDD	—	U.S. Shipping Board ..	—	P G	X	0.20	—	
Active *	NTJ	—	Navy ..	300, 600	P G	X	0.20	—	
Aculec *	KEQQ	—	U.S. Shipping Board ..	—	P G	X	0.20	—	
Acushnet *	NRU	75	Northern Michigan Transportation Co. ..	300, 600	P G	N	0.20	—	
Adams *	NTI	—	Navy ..	300, 600	P G	N	0.20	—	
Addison *	WBAU	—	U.S. Shipping Board ..	300, 600	P G	X	0.40	—	
Admiral Dewey *	WAY	100	Pacific S.S. Co. ..	300, 600	P G	X	0.20	—	
Admiral Evans *	KICZ	—	Pacific S.S. Co. ..	—	P G	X	0.20	—	
Admiral Farragut *	WAF	100	Pacific S.S. Co. ..	300, 450, 515, 600	P G	N	0.20	—	
Admiral Goodrich *	WRJ	200	Pacific S.S. Co. ..	300, 440, 520, 600	P G	N	0.20	—	
Admiral Mayo *	WZIO	300	U.S. Shipping Board ..	300, 410, 525, 600	P G	X	0.20	—	

Admiral Nicholson ?	KMAA	200	Pacific S.S. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.30 12
Admiral Rodman ?	WOA	150	Seattle S.S. Co.	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Admiral Schley ?	WAX	100	Pacific S.S. Co.	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Admiral Sebree ?	WAG	200	Pacific S.S. Co.*	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Admiral Sims ?	KXUO	200	Pacific S.S. Co.	..	..	300, 440, 525, 600	P G	..	N	0.20 11 0.30 12
Admiral Wainwright ?	WSF	100	Pacific S.S. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.30 12
Admiral Watson ?	WAW	150	Pacific S.S. Co.	..	..	300, 450, 525, 600	P G	..	N	0.20 11 0.30 12
Advance ?	KMV	300	Panama R.R. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.30 12
Adway ?	WBEA	—	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Aeolus NEF ?	NEF	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Afalkey ?	WBEE	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Afel ?	KISQ	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Afrinnia ?	KLAI	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Agamnon ?	NFH	—	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Agawam ?	WNIE	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Agria ?	WQAI	200	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Agrista ?	KLUU	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Agwisdale ?	WDOA	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Agwistar ?	KEPG	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Ahala ?	KECZ	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Aiken ?	WMUU	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Aileen ?	NVO	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Aimwell ?	WVUO	200	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Airlie ?	WBEI	200	Nacirema S.S. Corpn.	..	..	300, 600	P G	..	X	0.20
Ajax KOJ ?	KOJ	—	Altessandro Favri	..	..	—	P G	..	X	—
Ajax NAKD ?	NAKD	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.20 12
Alabama NBI ?	NBI	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Alabama WFB ?	WFB	150	Goodrich Transit Co.	..	..	300, 600	P G	..	N	0.10
Alabat ?	WSAO	—	U.S. Shipping Board	..	..	—	P G	..	N	0.20 11 0.40 12
Alameda NUGJ ?	NUGJ	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Alameda WAA ?	WAA	100	Alaska S.S. Co.	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Alamo ?	KEJ	200	Mallory S.S. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.40 12
Alamosa ?	WLUI	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Alanthus ?	WVEE	—	U.S. Shipping Board	..	..	—	P G	..	X	0.20
Alapaha ?	WZAI	200	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.30 12
Alaska WWS ?	WWS	150	Alaska S.S. Co.	..	..	300, 450, 510, 600	P G	..	N	0.20 11 0.30 12
Alaskan ?	WKA	200	Amer. Hawaiian S.S. Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Alba (El) ?	KKL	200	Southern Pacific Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Albany ?	NBJ	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Albatross KELD ?	KELD	150	Albatross Co.	..	..	300, 600	P G	..	X	—
Alberta KZA ?	KZA	200	F. Gilbert Bourne..	..	..	300, 600, 1,000	P G	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Albert Watts	KVQ	200	Amer.-Italian Comm. Corps.	300, 600	P G	X	Francs.	Francs.	
Alcis ?	KEPX	—	U.S. Shipping Board	—	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Alcona ?	WLUO	—	U.S. Shipping Board	—	P G	X	0.20	—	
Alden ?	NULK	—	Navy	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Alderman ⁵	KIFF	—	U.S. Shipping Board	—	P G	X	0.20	—	
Alector ³	KEPZ	—	U.S. Shipping Board	—	P G	X	0.20	—	
Aledo ⁴	KEPL	—	U.S. Shipping Board	—	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Alert NBL ⁶	NBL	—	Navy	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Algonquin ⁶	NRA	—	U.S. Coastguard Dept.	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Algorma ⁹	NEVP	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Alicia KZB ^{6 10}	KZB	60	Alfred I. Du Pont	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Allaguash ?	KVX	500	American Transatlantic Co.	300, 450, 525, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Allegheny NACZ ⁹	NACZ	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Allegheny WRAI	WRAI	—	Great Lakes Transit Corps.	—	P G	X	0.10	—	
Allen ¹¹	NJD	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Allenhurst ⁶	WNOA	—	U.S. Shipping Board	—	P G	X	0.20	—	
Allentown ?	KVIU	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Alliance ⁶	KMA	300	Panama R.R. Co.	300, 450, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Alliance ⁶	WRV	100	Gulf Mail S.S. Co.	300, 600	P G	X	0.10 ¹²	—	
Alice ⁶	KQUA	—	U.S. Shipping Board	—	P G	X	0.20	—	
Allison ?	WTOA	—	U.S. Shipping Board	—	P G	X	0.20	—	
Alloway ?	KTAA	—	U.S. Shipping Board	—	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Almirante (El) ⁵	KEG	250	Southern Pacific Co.	300, 600	P G	X	0.20	—	
Aloha ^{6 10}	KVH	200	A. C. James	300, 450, 600	P G	X	0.20	—	
Alpace ²	WBII	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Alpena ⁶	WCS	100	Herbert C. Turner	300, 500, 600	P G	X	0.10	—	
Alta ⁶	KICX	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Alushan ⁶	KECN	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Alvada ⁷	WGBR	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	

A. M. Byers ⁵	WMY ⁷	100	North American S.S. Co.	..	300, 600	P G	..	N	0.10
Ameland KCAU ⁶	KCAU	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20 11
Amelia ⁵	WRF	200	Atlantic Fruit Co.	..	300, 600	P G	..	N	0.40 12
American WKF ³	WKF	200	American Hawaiian S.S. Co.	..	300, 600	P G	..	N	0.20 11
Annon NBP ⁶	NBP	—	Navy	..	300, 600	P G	..	N	0.40 12
Annonosus ⁵	KEJC	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Amolco ⁵	KMB	200	Boston Molasses Co.	..	300, 450, 600	P G	..	N	0.20 11
Amoron ³	WTOE	—	—	..	300, 600	P G	..	N	0.40 12
Ampetco ⁶	KMAU	200	Standard Oil Co. of N.J.	..	300, 450, 600	P G	..	N	0.20 11
Amphion	WJS	200	U.S. Shipping Board	Coastwise	300, 600	P G	..	N	0.40 12
Anacortes ³	KQOA	300	Trans. Co.	..	300, 600	P G	..	N	0.20
Ancon ⁶	KMS	300	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Andalusia ⁷	WJA	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20 11
Anderton ⁶	NAGN	—	Navy	..	300, 600	P G	..	N	0.20 11
Andrea ⁷	WDEE	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.40 12
Andrea F. Luckenbach ⁷	KIFV	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20 11
Androscoggin ⁶	NRD	150	U.S. Coastguard Dept.	..	300, 600	P G	..	N	0.40 12
Anemone ⁹	NABP	—	Navy	..	300, 600	P G	..	N	0.20 11
Angeles (Los) ¹	WOL	150	Union Oil Co. of California	..	300, 600, 1800	P G	..	N	0.40 12
Angelina ⁷	KIFT	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.40 12
Anima ³	KROE	300	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Anna WJD ³	WJD	200	U.S. Shipping Board	..	300, 450, 600	P G	..	N	0.20 11
Annapolis ⁹	NBR	—	Navy	..	300, 600	P G	..	N	0.40 12
Ann Arbor No. 3	WDN	125	Ann Arbor Rld. Co.	..	300, 600	P G	..	N	0.10
Ann Arbor No. 4	WDO	125	Ann Arbor Rld. Co.	..	300, 600	P G	..	N	0.10
Ann Arbor No. 5	WDP	125	Ann Arbor Rld. Co.	..	300, 600	P G	..	N	0.10
Ann Arbor No. 6	WDQ	100	Ann Arbor Rld. Co.	..	300, 600	P G	..	N	0.20 11
Annetta ⁵	WRG	—	Atlantic Fruit Co.	..	300, 600	P G	..	N	0.40 12
Annetta Ralph	KETZ	—	Rolph Nav. & Coal Co.	..	300, 600	P G	..	N	0.20 11
Anniston ³	KIDM	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.40 12
Anoka ⁵	KOEE	200	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Anthera ⁵	WNWA	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Anthony ⁹	NEVS	—	Navy	..	300, 600	P G	..	N	0.20 11
Antilla ³	KWD	300	New York & Cuba Mail S.S. Co.	..	300, 450, 600	P G	..	N	0.40 12
Anyox ⁷	WCJ	100	Coastwise & S.S. Barge Co.	..	300, 600	P G	..	N	0.20 11
Aowa ⁵	WRJA	200	U.S. Shipping Board	..	300, 600	P G	..	N	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Meters (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.									
Apache KVA ⁵	KVA	200	Clyde S.S. Co.	300, 600	P G	N	—	—	Frans. 0.20 11 0.40 12
Apache KYY ^{5 10}	KYY	—	R. F. Herrick	300, 600	P G	—	—	—	—
Apache NACB ⁵	NACB	100	U.S. Coastguard Dept.	300, 600	P G	N	—	—	0.20
Apalachee ⁵	WSAE	200	U.S. Shipping Board	300, 600	P G	N	—	—	0.20 11
Apex ⁵	KGUI	150	Wilson Fisheries Co.	300, 600	P G	X	—	—	0.20 11 0.40 12
Apples ⁵	WMV	100	U.S. Shipping Board	300, 600	P G	N	—	—	0.20
Aquilo KOCJ ⁵	KOCJ	—	H. F. Alexander	300, 600	—	N	—	—	—
Arabia NAVJ ⁵	NAVJ	—	Navy	300, 600	P G	N	—	—	0.20 11 0.40 12
Arado ⁵	WVUI	—	U.S. Shipping Board	300, 600	P G	N	—	—	0.20
Arambi ⁵	KESF	200	U.S. Shipping Board	300, 600	P G	X	—	—	0.20 11
Aramis ^{5 10}	WDZ	120	A. H. Marks Harvard Club	300, 450, 600	P G	X	—	—	0.20 11 0.40 12
Arapahoe ⁵	KVB	200	Clyde S.S. Co.	300, 450, 600	P G	N	—	—	0.20 11 0.40 12
Arbutus ⁵	NAGM	—	Navy	300, 600	P G	N	—	—	0.20 11 0.40 12
Arcadia ⁵	WWD	200	U.S. Shipping Board	300, 600	P G	N	—	—	0.20 11 0.40 12
Arcata ⁵	NADD	—	Navy	300, 600	P G	X	—	—	0.20 11 0.40 12
Archer ⁵	KXG	300	U.S. Shipping Board	300, 600	P G	N	—	—	0.20 11 0.40 12
Arcturus ⁵	NCO	—	Navy	300, 600	P G	N	—	—	0.20 11 0.40 12
Ardena ⁵	KBEU	—	U.S. Shipping Board	300, 600	P G	X	—	—	0.20
Ardmore ⁵	KIA	250	Standard Oil Co. of N.J.	300, 450, 600	P G	X	—	—	0.20 11 0.40 12
Arenas KIRM ⁵	KIRM	—	U.S. Shipping Board	300, 600	P G	X	—	—	0.20
Arethusa ⁵	NBU	—	Navy	300, 600	P G	N	—	—	0.20
Argentina ⁵	KIKS	—	—	300, 600	P G	X	—	—	0.20
Argonne ⁵	KSIO	200	Argonne S.S. Co.	300, 450, 600	P G	X	—	—	0.20 11 0.40 12
Argyll ¹	WTB	150	Union S.S. Co.	300, 600, 1,800	P G	X	—	—	0.20 11 0.40 12
Arizona NBW ⁵	NBW	—	Navy	300, 600	P G	N	—	—	0.20 11 0.40 12
Arizona WPG ⁵	WPG	150	Goedeleb Transit Co.	300, 600	P G	X	—	—	0.20 11 0.40 12

Arkansas *	..	NBV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20 11 0.40 12 0.20
Arlington	..	KZY	200	New England Fuel & Transportation Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Armenia *	..	KYM	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Arroostook *	..	NMK	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Artemis WQS *	..	WOS	250	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Artisan *	..	KBOE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Arundel KETQ ?	..	KETO	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Arvonia *	..	WMOE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Asabeth *	..	KIXG	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Ascutney *	..	KYV	250	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Asbee *	..	KIGZ	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Asburn *	..	WBOE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Ashtabula WEZ *	..	WEZ	125	Penny. & Ontario Nav. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Askawake ?	..	KETM	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Asotin ?	..	KILD	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Aspenhill ?	..	KETR	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Asquam *	..	KISV	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Assinippi *	..	KIPB	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Astoria KRIE ?	..	KRIE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Astoria WRL *	..	WRL	100	Viking Shipping Co.	..	..	..	300, 450, 525, 600	P G	..	X	0.20 11 0.40 12 0.20
Astral *	..	KIQ	150	Standard Transportation Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12 0.20
Asuncion *	..	WTX	150	Standard Oil Co. of California	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Atenas *	..	KDK	500	United Fruit Co.	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Atlantic NENN *	..	NENN	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Atlantis *	..	KIGN	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Atlas *	..	WTT	150	Standard Oil Co. of California	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Auburn *	..	WDOE	150	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Augusta *	..	KMO	200	West India Sugar Corporation	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Auk *	..	NIJT	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Aulick *	..	NERG	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Aurora *	..	WIAU	250	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Ausable *	..	WWP	—	American Transatlantic Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Avocet *	..	NADP	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Avondale ?	..	KKAU	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Awonsdew *	..	KEMC	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20
Ayiwin *	..	NIH	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Azalea *	..	NXU	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20
Azatoa *	..	—	—	Immigration Service	..	..	..	—	—	..	—	—
Azteco *	..	KZC	150	A. C. Burage	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
Beatrice ¹¹	KLJ	200	A. H. Bull S.S. Co.	300, 600	P G	X	Francs.	Francs.	
Beaufort ⁹	NGP	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Beaumont ⁵	WXUA	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Beaver NEQQ ⁹	NEQQ	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Beaver WWB ⁵	WWB	200	S. Francisco & Portland S.S. Co.	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Bedloe ⁶	KQUI	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Bedminster ⁷	WQIE	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Beechland ⁶	KETB	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belair ³	WTOI	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belancuan	WPEA	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belding ⁵	KPUE	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belfast ⁵	KRD	200	Eastern S.S. Lines	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belfort KIQB ⁶	KIQB	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belgrade ⁷	WKOU	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belknap ⁹	NEZZ	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Bell ⁶	NATG	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Bell Brook ⁴	KQEI	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Bellbuckle ⁵	KITK	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Bellissima ²	KODS	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Bellingham ²	WCIA	300	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Bellota ⁷	KVEA	—	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Beloit ⁶	KNIO	200	U.S. Shipping Board	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belvedere ⁶	KVU ⁷	200	Hibbard & Stewart	300, 400, 500, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Belvidere ⁷	KEOK	300	U.S. Shipping Board	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Benjamin Brewster ⁵	KFS	250	Standard Oil Co. of N.J.	300, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Benj. F. Panchard ⁷	WLA	100	Nacirema S.S. Corp.	300, 450, 525, 600	P G	X	0.20 ¹¹ 0.40 ¹²	—	
Benkam ⁹	NIJ	—	Navy	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	
Benoni ⁶	KERR	—	U.S. Shipping Board	300, 600	P G	N	0.20 ¹¹ 0.40 ¹²	—	

Ship	WON	300	Union Oil Co. of California	300, 600, 1,800	P.G.	X	0.20 12
Brea (La) ¹	..	300	..	..	..	..	0.20 11
Breck ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Breckinridge ⁹	—	Navy ..	300, 600	P.G.	N	0.20 11
Breese ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Bremerton ³	200	U.S. Shipping Board	300, 600	P.G.	X	0.20 11
Brentwood ⁷	—	U.S. Shipping Board	300, 600	P.G.	X	0.20
Brevard ⁹	—	U.S. Shipping Board	300, 600	P.G.	X	0.20
Brickliff ⁹	—	U.S. Shipping Board	300, 600	P.G.	X	0.20
Bridge ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Bridgeport ⁹	—	Navy ..	300, 600	P.G.	N	0.20 11
Brilliant ⁵	200	Standard Oil Co. of N.Y.	300, 450, 600	P.G.	X	0.40 12
Brindilla ⁵	300	Standard Oil Co. of N.J. ..	300, 450, 600	P.G.	X	0.20 11
Bristol	—	Coastwise Transportation Co.	—	—	—	0.40 12
Broad Arrow ⁵	300	Standard Transportation Co.	300, 450, 600	P.G.	X	0.20 11
Brockhaven ⁹	200	U.S. Shipping Board	300, 600	P.G.	X	0.40 12
Brockton ⁴	50	Colonial Nav. Co. ..	300, 600	P.G.	X	0.20
Bromela ⁵	200	U.S. Shipping Board	300, 600	P.G.	N	0.15
Brompton ⁹	200	U.S. Shipping Board	300, 600	P.G.	N	0.20
Bronche ⁹	200	U.S. Shipping Board	300, 600	P.G.	X	0.20
Brookdale ⁷	200	U.S. Shipping Board	300, 600	P.G.	X	0.20
Brookfield ⁹	200	U.S. Shipping Board	300, 600	P.G.	X	0.20
Brookland ⁹	200	U.S. Shipping Board	300, 600	P.G.	X	0.20 11
Brooklyn ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Brooks ⁹	—	Navy ..	300, 600	P.G.	N	0.20 11
Brookside ⁷	—	U.S. Shipping Board	300, 600	P.G.	X	0.40
Brookwood ⁹	—	U.S. Shipping Board	300, 600	P.G.	X	0.20
Broome ⁹	—	Navy ..	300, 600	P.G.	N	0.20 11
Brutus ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Brynilda ⁵	200	Brynilda Shipping Corp.	300, 450, 600	P.G.	X	0.40 12
Buccaneer ⁵	150	Freeport & Tampico Fuel Oil Trans. Corp.	300, 600	P.G.	X	0.20 11
Buchanan ⁹	—	Navy ..	300, 600	P.G.	N	0.40 12
Buchannon ¹⁷	—	U.S. Shipping Board	300, 600	P.G.	X	0.20 11
Buckhorn ¹	200	U.S. Shipping Board	300, 600	P.G.	X	0.40 12

Station	Call	Power	Frequency	Service	Remarks	Notes	Time	Day	Month	Year
Caesars	NCY	400	11.0	Naval	U.S. Shipping Board	300, 600	0.20	11	0.40	12
Calala	KQAO	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calamarc	KLC	500	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Caldwell	NSI	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calico	KXII	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calico	KYQ	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
California	NDF	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calis	KXIO	150	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calis	WPUI	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Callab	NQO	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Callao	WHF	150	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Callao	KPEE	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Callao	KINW	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Callao	KSP	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calver	KXIE	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calvert	WTUI	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Calvin	KRN	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Camaguey	KWI	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Cambridge	KGR	50	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Cambridge	KIRR	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Camden	KRC	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Camden	NAPR	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Camden	WTAU	200	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Camden	NCR	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	WTEA	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	WQEU	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	WKZ	250	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	NCS	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KIOD	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	WFIE	150	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KPW	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KMIE	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KZUE	300	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	WDOI	100	11.0	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KREA	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	NIVD	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20
Canadagua	KSAI	—	—	U.S. Shipping Board	300, 600	0.20	0.20	0.20	0.20	0.20

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wave length in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Caponka ⁷	WCAO	200	U.S. Shipping Board	300, 600	P G	X	Francs.	Francs.	
Captain (Ei) KKH ^s ..	KKH	200	Southern Pacific Co.	300, 450, 600	P G	X	0.20 11	—	
Captain (Ei) WNB ^s ..	WNB	300	Standard Oil Co. of N.J.	300, 450, 600	P G	X	0.20 11	—	
Captain A. F. Lucas ^s ..	WTV	150	Standard Oil Co. of California	300, 450, 600	P G	X	0.20 11	—	
Captain A. M. Wetherill ^s	WYT	—	U.S. Coastguard Dept.	400	O	X	—	—	
Captain Charles W. Rowell ^s	WYI	—	U.S. Coastguard Dept.	400	O	X	—	—	
Captain Gregory Barrett ^s	WYP	—	U.S. Coastguard Dept.	400	O	X	—	—	
Captain James Fornance ^s	WYM	—	U.S. Coastguard Dept.	400	O	X	—	—	
Captain T. M. Morrison ^s	WYZ	—	U.S. Coastguard Dept.	1,200	O	X	—	—	
Catracas ^s ..	KDB	200	U.S. Shipping Board	300, 450, 600	P G	X	0.20 11	—	
Cardinal ^s ..	NAFN	—	Navy	300, 600	P G	N	0.20 11	—	
Carib KJIU ^s ..	KJIU	—	Atlantic Gulf & W. Indies S.S. Lines	—	—	N	0.20 11	—	
Carib KMIA ^s ..	KMIA	—	Navy	300, 600	P G	N	0.20 11	—	
Carib NIF ^s ..	NIF	—	Navy	300, 600	P G	N	0.20 11	—	
Caribbean	KGUE	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Caribon ^s ..	WSIA	—	United Fruit Co.	300, 600	P G	N	0.20 11	—	
Carillo ^s ..	KDE	500	Bradley Transportation Co.	300, 600	P G	N	0.20 11	—	
Carl D. Bradley ^s	WGN	100	Carmen Shipping Co.	300, 425, 540, 600	P G	N	0.20 11	—	
Carmen WIP ^s	WIP	—	Navy	300, 600	P G	N	0.20 11	—	
Carola IV ^s ..	NNO	—	Goodrich Transit Co.	300, 600	P G	N	0.20 11	—	
Carolina ^s ..	WFE	100	Garland S.S. Corporation	300, 600	P G	N	0.20 11	—	
Carolinian ^s ..	KJF	200	A. H. Bull S.S. Co.	300, 600	P G	N	0.20 11	—	
Carolyn ^s ..	KZG	—	Navy	300, 600	P G	N	0.20 11	—	
Carabasset ^s ..	NEVO	200	United Fruit Co.	300, 600	P G	N	0.20 11	—	
Cartago ^s ..	KDB	300	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Catracas ^s ..	WYI	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Catracas ^s ..	WYI	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.	Remarks.
							Per Word.	Mini-mum per Radio-telegram.
UNITED STATES OF AMERICA—contd.							Francs.	Francs.
Charles M. Everest	WPOU	—	Vacuum Oil Co.	—	P G	—	—	—
Charles O. Jenkins	WFT	100	Detroit & Cleveland Nav. Co.	300, 450, 800	P G	X	0.10	0.20 11
Charles Pratt	KSQ	300	Standard Oil Co. of N.J.	300, 450, 800	P G	X	0.20 11	0.40 12
Charles S. Osbourne	NABG	—	Navy	300, 800	P G	N	0.20 11	0.40 12
Charleston	NFE	—	Navy	300, 800	P G	N	0.20 11	0.40 12
Charlot	WMUI	—	U.S. Shipping Board	300, 800	P G	N	0.20 11	0.40 12
Charlton Hall	KLU	200	U.S. Steel Products Co.	300, 800	P G	X	0.20 11	0.40 12
Chase	NUMK	—	Navy	300, 800	P G	X	0.20 11	0.40 12
Chas. R. Van Hise	WFUI	—	U.S. Shipping Board	300, 800	P G	N	0.20 11	0.40 12
Chattanooga KIDN	KIDN	—	U.S. Shipping Board	300, 800	P G	X	0.20 11	0.40 12
Chattanooga NGI	NGI	—	Navy	300, 800	P G	X	0.20 11	0.40 12
Chauncey	NIF	—	Navy	300, 800	P G	N	0.20 11	0.40 12
Chautaugua	KIFK	200	U.S. Shipping Board	300, 800	P G	N	0.20 11	0.40 12
Chaubault	KJAA	—	U.S. Shipping Board	300, 800	P G	X	0.20 11	0.40 12
Chelan	WCAU	—	U.S. Shipping Board	300, 800	P G	X	0.20 11	0.40 12
Chenung	NARG	—	Navy	300, 800	P G	X	0.20 11	0.40 12
Cherokee	KVK	200	Clyde S.S. Co.	300, 800	P G	N	0.20 11	0.40 12
Cheron	KNH	200	U.S. Shipping Board	300, 800	P G	N	0.20 11	0.40 12
Chesapeake	NUJB	—	Navy	300, 800	P G	X	0.20 11	0.40 12
Chester	NDG	—	Navy	300, 800	P G	N	0.20 11	0.40 12
Chester Sun	WAS	150	Sun Company	300, 800	P G	N	0.20 11	0.40 12
Chester W. Chapin	KXQ	50	New England S.S. Co.	300, 800	P G	X	0.20 11	0.40 12
Chesnut Hill	KVG	200	U.S. Shipping Board	300, 800	P G	N	0.20 11	0.40 12
Chewink	NLIV	—	Navy	300, 800	P G	N	0.20 11	0.40 12

Chibiabos ⁷	200	WPOE	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Chicago NDI ⁶	—	NDI	Navy	..	..	300, 600	P G	..	N	0.40 ¹²
Chicago WAC ⁷	100	WAC	Booth Fisheries Co.	..	..	300, 600	P G	..	X	0.20
Chicago Bridge ⁷	300	KECG	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Childs ⁶	—	NULN	Navy	..	..	300, 600	P G	..	N	0.20 ¹¹
Chimo ⁵	200	KKOO	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.40 ¹³
China WWA ⁵	150	WWA	Kerr Nav. Corp.	..	..	300, 600	P G	..	N	0.20 ¹¹
Chinanpa ⁵	300	KSC	Standard Oil Co. of N.J.	..	..	300, 600	P G	..	X	0.40 ¹³
Chincha ⁵	300	KJZ	Nafra Company	..	..	300, 450, 600	P G	..	N	0.20 ¹¹
Chipchung ³	—	WBIA	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.40 ¹³
Choctaw ⁹	—	NTV	Navy	..	..	300, 600	P G	..	N	0.20 ¹¹
Christopher Columbus ⁶	150	WFI	Goodrich Transit Co.	..	..	300, 600	P G	..	X	0.40 ¹³
Cid (El) ⁶	200	KKTP	Southern Pacific Co.	..	..	300, 450, 600	P G	..	X	0.10
Cineas ^{..}	—	KEXP	—	..	..	300, 600	P G	..	X	0.20
City of Alpena II ⁶	125	WEH	Detroit and Cleveland Nav. Co.	..	..	300, 600	P G	..	X	0.10
City of Atlanta ⁵	200	KFB	Ocean S.S. Co. of Savannah	..	..	300, 450, 600	P G	..	N	0.20 ¹¹
City of Augusta ⁵	300	KFJ	Ocean S.S. Co. of Savannah	..	..	300, 450, 600	P G	..	N	0.40 ¹³
City of Bangor ⁵	200	KRH	Eastern S.S. Lines	..	..	300, 600	P G	..	X	0.20 ¹¹
City of Benton Harbor ⁶	150	WDV	Graham & Morton Trans. Co.	..	..	300, 600	P G	..	X	0.40 ¹³
City of Brockton ⁴	—	KXO	New England S.S. Co.	..	..	300, 600	P G	..	X	0.10
City of Buffalo ⁵	100	WFQ	Cleveland & Buffalo Trans. Co.	..	..	300, 600	P G	..	X	0.10
City of Cleveland III ⁵	125	WEA	Detroit & Cleveland Nav. Co.	..	..	300, 600	P G	..	N	0.20 ¹¹
City of Columbus ⁵	200	KFA	Ocean S.S. Co. of Savannah	..	..	300, 450, 600	P G	..	N	0.40 ¹³
City of Detroit II ⁵	125	WEC	Ocean S.S. Co. of Savannah	..	..	300, 450, 500, 600	P G	..	N	0.10
City of Detroit III ⁵	125	WEF	Ocean S.S. Co. of Savannah	..	..	300, 600	P G	..	N	0.10
City of Erie ⁵	100	WFP	Cleveland & Buffalo Transit Co.	..	..	300, 600	P G	..	X	0.10
City of Eureka ⁵	300	KEFT	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
City of Everett ³	250	KTO	Standard Transportation Co.	..	..	300, 600	P G	..	X	0.20
City of Fairbury ⁷	—	KISR	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
City of Grand Rapids ⁵	100	WDS	Graham & Morton Trans. Co.	..	..	300, 600	P G	..	X	0.10
City of Lowell ⁴	50	KXB	New England S.S. Co.	..	..	300, 550, 600	P G	..	X	0.15
City of Mackinac II ⁶	125	WEB	Detroit & Cleveland Nav. Co.	..	..	300, 600	P G	..	X	0.10
City of Montgomery ⁵	300	KFY	Ocean S.S. Co. of Savannah	..	..	300, 450, 600	P G	..	N	0.20 ¹¹
City of Para ¹	—	WWF	Pacific Mail S.S. Co.	..	..	300, 600	P G	..	X	0.40 ¹³
City of Puebla ⁶	200	WGO	Puebla S.S. Corporation	..	..	300, 600	P G	..	N	0.20 ¹¹
										0.40 ¹²

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.									
City of Rockland ⁵	KRI	200	Eastern S.S. Lines	300, 600	P G	X	0.20	—	Francs.
City of Rome ⁵	KQZ	200	Ocean S.S. Co. of Savannah	300, 450, 600	P G	N	0.20 11	—	—
City of Savannah ⁵	KFK	200	Ocean S.S. Co. of Savannah	300, 450, 600	P G	N	0.20 11	—	—
City of Seattle ⁵	WGA	100	Pacific Coast Co. ..	300, 600	P G	N	0.40 12	—	—
City of South Haven ⁵	NAVB	—	Navy	300, 600	P G	N	0.20 11	—	—
City of Spokane ⁷	KILL	—	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	—
City of St. Ignace ⁵	WEG	125	Detroit & Cleveland Nav. Co. ..	300, 600	P G	X	0.20	—	—
City of St. Louis ⁵	KFZ	300	Ocean S.S. Co. of Savannah	300, 600	P G	N	0.10	—	—
City of Sydney ⁶	KKEI	—	L. A. Pederson	—	—	—	0.20 11	—	—
City of Taunton ⁴	KNL	50	Newington S.S. Co. ..	300, 550, 600	P G	N	0.15	—	—
City of Topeka ⁵	WGY	100	Pacific Coast Co. ..	300, 600	P G	X	0.20 11	—	—
Clackamas ⁵	KQEA	—	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	—
Clairton ⁵	KIKR	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	—
Clara ⁵ ..	WJH	200	U.S. Shipping Board	300, 450, 600	P G	N	0.20	—	—
Clare ⁵ ..	KNE	200	A. H. Bull S.S. Co. ..	300, 600	P G	X	0.20 11	—	—
Clark Mills ³	KOCQ	—	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	—
Claxton ⁵ ..	NEQZ	—	Navy	300, 600	P G	N	0.20	—	—
Clemens A. Reiss ⁵	WNH	200	Reiss S.S. Co. ..	300, 600	P G	X	0.20 11	—	—
Celmsion ⁵ ..	NEZI	—	Navy	300, 600	P G	N	0.40 12	—	—
Cleopatra ⁵ ..	KIOL	—	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	—
Cletus Schneider ⁵	KMFO	175	U.S. Shipping Board	300, 600	P G	X	0.10	—	—
Cleveland ⁵ ..	NDM	—	Navy	300, 600	P G	N	0.20 11	—	—
Clincho ⁶	KENX	150	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	—
Clio ⁵ ..	KIKZ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	—
Clovia ⁵ ..	KILB	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	—
Coalinga ¹	WOT	150	Union S.S. Co. ..	300, 600, 1,800	P G	X	0.20 11	—	—
Coamo ⁵	KGA	200	N.Y. & Porto Rico S.S. Co. ..	300, 600	P G	N	0.10 12	—	—

Cohasset ⁷	WTJL	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Cokato ⁸	WMUE	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Cokesit ⁸	WQUA	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Cold Spring ⁸	KIQK	300	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Cole ⁸	NEST	—	Navy	..	300, 600	P G	..	N	0.20
Col. E. L. Drake ⁸	WTS	150	Standard Oil Co. of California	..	300, 600	P G	..	X	0.40
Colheun ⁸	NAJL	—	Navy	..	300, 600	P G	..	N	0.20
Coloma ⁷	KNIU	200	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Colon KMX ⁸	KMY	250	Panama R.R. Co.	..	300, 600	P G	..	N	0.20
Colonel George Armistead ⁸	WYG	—	U.S. Signals	..	600	O	..	X	—
Colorado ⁸	NECR	—	Navy	..	300, 600	P G	..	N	0.20
Colorado Springs ⁸	KIKL	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.40
Col. P. S. Miché ⁸	NZU	—	U.S. Signals	..	200, 300, 425, 600	O	..	X	0.20
Columbia NGA ⁸	NGA	—	Navy	..	300, 600	P G	..	N	—
Columbia WBH ¹	WBH	150	Pacific Mail S.S. Co.	..	300, 600	P G	..	N	0.20
Columbia WHC ⁸	WHC	150	U.S. Shipping Board	..	300, 600	P G	..	X	0.40
Columbine NLL ⁸	NLL	250	Bureau of Lighthouses	..	600, 750, 1,000	O	..	X	0.20
Columbine WLOI ⁷	WLOI	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Columbo ⁸	KSUI	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Colusa ⁸	WIN	200	Grace S.S. Co.	..	300, 600	P G	..	N	0.20
Comal ⁸	KEM	200	Mallory S.S. Co.	..	300, 600	P G	..	N	0.40
Comanche KVC ⁸	KVC	200	Clyde S.S. Co.	..	300, 600	P G	..	N	0.20
Comanche NRW ⁸	NRW	100	U.S. Coastguard Dept.	..	300, 600	P G	..	N	0.20
Comet ⁸	KTJ	200	Standard Oil Co. of N.Y.	..	300, 450, 600	P G	..	X	0.40
Comfort ⁸	NDO	—	Navy	..	300, 600	P G	..	N	0.20
Commonwealth KXC ⁴	KXC	50	New England S.S. Co.	..	300, 550, 600	P G	..	N	0.40
Communipaw ⁸	KOE	200	Standard Oil Co. of N.J.	..	300, 600	P G	..	X	0.15
Comus ⁸	KKD	200	Southern Pacific Co.	..	300, 450, 600	P G	..	N	0.20
Concho ⁸	KEC	300	Mallory S.S. Co.	..	300, 600	P G	..	N	0.40
Concord KNC ⁴	KNC	50	Colonial Nav. Co.	..	300, 550, 600	P G	..	N	0.20
Concord NQH ⁸	NQH	—	Navy	..	300, 600	P G	..	N	0.15
Conestoga ⁸	NAGP	—	Navy	..	300, 600	P G	..	N	0.40

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Congaree ³	WVEA	—	U.S. Shipping Board	300, 600	P G	X	France.	0.20	
Conneaut ⁵	WCU	100	Gulf Refining Co.	300, 600	P G	X		0.10	
Connecticut ⁶	NDQ	—	Navy	300, 600	P G	N		0.20 11	
Conner ⁶	NSN	—	Navy	300, 600	P G	N		0.40 11	
Connersville ⁷	WKOO	—	U.S. Shipping Board	300, 600	P G	X		0.40 11	
Conotton ⁸	WVAO	200	U.S. Shipping Board	300, 600	P G	X		0.20	
Consort ⁸	KDOI	300	U.S. Shipping Board	300, 600	P G	X		0.20	
Constellation ⁹	NEDF	—	Navy	300, 600	P G	N		0.20 11	
Constitution ⁹	NEBF	—	Navy	300, 600	P G	N		0.40 11	
Continental Bridge ⁵	KOCP	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Contoocook ⁵	WVAU	200	U.S. Shipping Board	300, 600	P G	X		0.20	
Conyngham ⁶	NJE	—	Navy	300, 600	P G	N		0.20 11	
Coolspring ⁶	KEFG	—	U.S. Shipping Board	—	P G	—		0.40 11	
Coosa ⁶	WLF	200	U.S. Shipping Board	300, 450, 600	P G	X		0.20	
Copalgrove ³	KEFJ	—	U.S. Shipping Board	300, 600	P G	N		0.20	
Coperas ⁷	WTEU	150	U.S. Shipping Board	300, 600	P G	N		0.10	
Coppename ⁶	KDF	500	United Fruit Co.	300, 600	P G	X		0.10	
Cora F. Cressy ⁵	WVAA	—	U.S. Shipping Board	300, 600	P G	X		0.20	
	KSZ	200	France & Canada S.S. Corporation	300, 600	P G	X		0.20 11	
Coral ⁶	KIMF	—	U.S. Shipping Board	300, 600	P G	X		0.40 11	
Corapeake ⁵	WVAE	200	U.S. Shipping Board	300, 600	P G	X		0.20	
Corcoran ⁷	WVAI	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Cordova ⁷	WAR	100	Texas Co.	300, 600	P G	X		0.20 11	
Corilla ⁶	WPIA	—	U.S. Shipping Board	300, 600	P G	X		0.30 11	
Cormorant NIKV ⁶	NIKV	—	Navy	300, 600	P G	X		0.20	
Cornelia ³	KZD	200	Bull Insular S.S. Co.	300, 600	P G	N		0.20 11	
Corning ⁵	KIH	300	Standard Oil Co. of N.J.	300, 600	P G	X		0.20 11	
Coraucopia ⁵	WNIU	200	U.S. Shipping Board	300, 450, 600	P G	X		0.40 11	

..	NNQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 11
Corona NNQ *	WFZ	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coronado WFZ *	KQIA	150	N.Y. & Porto Rico S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Corozal ..	..	..	..	..	..	..	..	..	..	..	..
Cortales ?	WPIE	150	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Corsair * 18	KYC	—	J. P. Morgan	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Corsican WPII *	WPII	150	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Corson *	KIOV	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Corvallis ?	KIBT	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Costa Rica *	WOI	500	L. A. Pederson	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Costigan ?	KINF	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Costilla *	WMEA	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cotati ?	KIOF	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cote Blanche *	WMBE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cotopaxi ?	WMEI	150	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cottal ?	WCEA	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cottonplant ?	WMEU	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cottonwood ?	WTOU	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coulter ?	WQAO	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Council Bluffs *	WVOA	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Couparle *	WVOE	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Courageous *	WVUA	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Courtois *	WVOI	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coushatta *	WVOO	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coutolene *	WVOU	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Covait *	KEMM	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Covendale *	KEMN	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Covena *	KEMP	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coverun *	KEMN	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowan ?	KENN	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowardin *	KESL	200	Nacirema S.S. Corp.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowboy ?	WMAI	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowes *	WMAO	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowell *	NETV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 11
Covenshannock ?	WMAE	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coweta *	WNEU	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Cowiche *	WXOA	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Coyote *	KXUU	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Crabtree *	WXOE	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craftsman *	KIBR *	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craigowne *	WXOI *	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craigowne ?	WXOO	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craincreek *	WNAA	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Crane NIFB *	NIFB	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 11
Cranenest *	WNAE	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craster Hall *	KLK	200	U.S. Steel Products Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Crathorne *	WSOO	100	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 11
Craven *	NERJ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 11

Custodian KIVZ *	KIVZ	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Cuyana *	NOD	—	Navy	..	..	300, 600	P G	..	N	0.20 11
Cypress *	NLM	250	Bureau of Lighthouses	..	..	600, 750, 1,000	O	..	X	0.40 12
Cyrus W. Field *	WXS	130	U.S. Signals	..	..	300, 600	O	..	X	—
D.1 *	NXP	—	Navy	..	..	300, 600	P G	..	N	0.20 11
D.2 *	NXQ	—	Navy	..	..	300, 600	P G	..	N	0.40 12
D.3 *	NXR	—	Navy	..	..	300, 600	P G	..	N	0.20 11
Daca *	KKIA	200	Atlantic & Caribbean S.N. Co.	..	..	300, 600	P G	..	X	0.40 12
Dade County *	KIJZ	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dahlgren *	NVZ	—	Navy	..	..	300, 600	P G	..	N	0.20
Dakota *	WKD	200	A. H. Bull S.S. Co.	..	..	300, 600	P G	..	X	0.20 11
Dagada *	KEDC	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.40 12
Dalana *	KQAU	200	Nacirena S.S. Corporation	..	..	300, 600	P G	..	X	0.20 11
Dallas KEQB *	KEQB	300	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.40 12
Dallas NENM *	NENM	—	Navy	..	..	300, 600	P G	..	N	0.20 11
Damacan *	KELS	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Damara *	KPEO	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dancey *	WSAA	200	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Danebrog *	WXAQ	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dania WBOI *	WBOI	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dannedake *	KESS	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Danville *	KEST	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Daram *	WKUA	150	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
D'Arbonne *	KESX	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dardania *	KICD	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dardora *	KELT	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Darrah *	WZIA	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Datis *	KICF	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Dauperata *	KIZI	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
Davidson County *	KIKX	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11
Davis *	NIF	—	Navy	..	..	300, 600	P G	..	N	0.40 12
Dawnlite *	KPP	200	Standard Oil Co. of N.J.	..	..	300, 450, 600	P G	..	X	0.20 11
Daylite *	KPR	250	Standard Oil Co. of N.J.	..	..	300, 450, 600	P G	..	X	0.40 12
Dayton *	KNP	300	Standard Oil Co. of N.J.	..	..	300, 450, 600	P G	..	X	0.20 11
Decatur Bridge *	KECJ	300	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.40 12
Deepwater *	KLY	300	U.S. Shipping Board	..	..	300, 450, 600	P G	..	X	0.20
Deerfield *	WTIU	300	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20
Deerledge *	KIMD	300	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20
Defiance *	WSEA	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20
De Kalb *	NSB	—	Navy	..	..	300, 600	P G	..	N	0.20 11
Delavan *	KIRO	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.40 12
Delaware NEK *	NEK	—	Navy	..	..	300, 600	P G	..	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
Delco ?	KIZB	—	U.S. Shipping Board	300, 600	P G	X	Frans.	—	
Delfina *	KIVS	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Delight ?	KQOE	—	U.S. Shipping Board	300, 600	P G	X		0.20	
D'Isle *	KQVT	—	U.S. Shipping Board	300, 600	P G	X		0.20	
D'Long *	NWB	—	Navy	300, 600	P G	N		0.20 11	
Delphine *	KIFL	150	H. E. Dodge	300, 450, 600	P G	X		0.40 13	
Delphy *	NEZQ	—	Navy	300, 600	P G	N		0.10 11	
Democracy ?	WAQ	—	U.S. Shipping Board	300, 600	P G	N		0.20 11	
Dent ?	NEGF	—	Navy	300, 600	P G	N		0.40 13	
Denver *	NEM	—	Navy	300, 600	P G	N		0.20 11	
Deranof *	KOIO	—	U.S. Shipping Board	300, 600	P G	X		0.40 13	
Derbyline *	KIRT	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Deroche ?	KOBJ	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Dertona *	KICG	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Des Moines *	NEN	—	Navy	300, 600	P G	N		0.20 11	
De Soto *	KNI	250	Standard Oil Co. of N.J.	300, 600	P G	X		0.40 13	
Deva ?	KICK	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Devolente *	KIVR	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Dewey ?	KODT	—	U.S. Shipping Board	300, 600	P G	X		0.20 11	
D. G. Scofield *	WRD	150	Standard Oil Co. of California	300, 450, 600, 1,800	P G	X		0.40 13	
Dia (El) *	KKY	200	Southern Pacific Co.	300, 450, 600	P G	X		0.40 13	
Diablo ?	KEPD	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Diana KICJ *	KICJ	—	U.S. Shipping Board	300, 600	P G	X		0.20 11	
Dickerson *	NAFC	—	Navy	300, 600	P G	N		0.20 11	
Dio *	WNCO	300	U.S. Shipping Board	300, 600	P G	N		0.40 13	
Director KIGJ *	KIGJ	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Dirigo *	KEGM	—	U.S. Shipping Board	300, 600	P G	X		0.20	
Dix *	WXC	300	Army	600	P G	X		0.20	
Dixie *	NEP	—	Navy	300, 600	P G	N		—	
								0.20 11	
								0.10 13	

Dochet 7 Dochra 5	..	..	KIMR KGL	—	300	U.S. Shipping Board La Plata S.S. Co.	..	..	300, 600 300, 600	P G P G	..	..	N	0.20 0.20 11 0.40 12
Dolphin NEQ 5	..	..	NEQ	—	—	Navy	..	..	300, 600	P G	..	..	N	0.20 0.40 12
Donora 5	..	..	KIDZ	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	..	N	0.20
Dora WAH 5	..	..	WAH	100	Alaska S.S. Co.	..	..	..	300, 600	P G	..	..	N	0.20
Dorchester 5	..	..	KQD	200	Merchants & Miners Trans. Co.	..	..	..	300, 450, 600	P G	..	..	N	0.20 11 0.40 12
Dorothy Bradford 5	..	..	KNA	100	Cape Cod S.S. Co.	..	..	..	300, 600	P	..	..	N	—
Dorothy Palmer 5	..	..	KQW	200	France & Canada S.S. Corporation	..	..	..	300, 450, 600	P G	..	..	N	0.20 11 0.40 12
Dorsey 5	..	..	NELG	—	Navy	..	..	..	300, 600	P G	..	..	N	0.40 12
Downes 5	..	..	NIN	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Doyen 5	..	..	NUJS	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Doylestown 7	..	..	KIPG	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	..	N	0.20 11
Drayton 5	..	..	NET	—	Navy	..	..	..	300, 600	P G	..	..	N	0.40 12
Dreadnaught 5	..	..	NCX	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Dreadnought 5	..	..	WGL	—	Hind-Rolph & Co.	..	..	..	—	P G	..	..	N	—
Duncan 5	..	..	NIR	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Dungness WPOI 5	..	..	WPOI	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	..	N	0.20 11
Dupont 5	..	..	NWC	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Duquesne 7	..	..	KECS NEDD	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Durham NEDD 5	..	..	NACN	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Dyer 5	..	..	NXS	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
E.1 5	..	..	NXT	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
E.2 5	..	..	NEJB	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 1 5	..	..	NEJC	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 2 5	..	..	NEJD	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 3 5	..	..	NEJF	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 4 5	..	..	NEJG	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 5 5	..	..	NEJJ	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 6 5	..	..	NEJK	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 7 5	..	..	NEJL	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 8 5	..	..	NEJM	—	Navy	..	..	..	300, 600	P G	..	..	N	0.20 11 0.40 12
Eagle 9 5	..	..		—	Navy	..	..	..	300, 600	P G	..	..	N	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per-Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Eagle 10*	NEJN	—	Navy	300, 600	P G	N	Francs. 0.20 11	Francs.	
Eagle 11*	NEJP	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 12*	NEJQ	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 13*	NEJR	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 14*	NEJS	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 15*	NEJT	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 16*	NEJV	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 17*	NEJX	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 18*	NEJZ	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 19*	NEKB	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 20*	NEKC	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 21*	NEKD	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 22*	NEKF	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 23*	NEKG	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 24*	NEKJ	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 25*	NEKK	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 26*	NEXF	—	Navy	300, 600	P G	N	0.20 11	—	
Eagle 27*	NEXG	—	Navy	300, 600	P G	N	0.40 12	—	
Eagle 28*	NEXM	—	Navy	300, 600	P G	N	0.20 11	—	

Eagle 32 *	NEZJ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 33 *	NIBB	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 34 *	NIBD	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 35 *	NIBG	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 36 *	NIBK	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 37 *	NIBM	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 38 *	NIBN	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 39 *	NIBC	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 40 *	NIBF	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 41 *	NIBJ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 42 *	NIBL	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 43 *	NIBP	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 44 *	NIBQ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 45 *	NIBR	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 46 *	NIBS	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 47 *	NIBT	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 48 *	NIBV	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 49 *	NIBX	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 50 *	NIBZ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 51 *	NICB	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 52 *	NICC	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 53 *	NICD	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 54 *	NICF	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 55 *	NICG	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Eagle 56 *	NICJ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Eagle 57 *	NICK	—	Navy	300, 600	P G	N	Francs. 0.20 11 0.10 12	—	
Eagle 58 *	NICL	—	Navy	300, 600	P G	N	0.20 11 0.10 12	—	
Eagle 59 *	NICM	—	Navy	300, 600	P G	N	0.40 11 0.20 12	—	
Eagle 60 *	NICN	—	Navy	300, 600	P G	N	0.10 12 0.20 11 0.40 12	—	
East Cape *	KENC	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
East Cliff *	KSLA	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastling *	KEID	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Chief *	KSEI	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Cross *	WKU	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Easterner *	WGEA	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Eastern King *	WFEA	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Light *	WKH	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Eastern Queen *	KXUE	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Sea *	KTEA	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Shore *	WKIO	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Star *	KTAU	—	Detroit & Cleveland Nav. Co.	300, 600	P G	X	0.10	—	
Eastern States *	WEE	125	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastern Sun *	KTF	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
East Indian *	WGEI	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Eastport *	WGLE	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
East Side *	KIMQ	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
East Wind *	KEKB	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Eclipse *	KEGF	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
E. C. Pope *	WZAU	300	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 12	—	
Ecuador *	WBN	200	Pacific Mail S.S. Co.	300, 600, 1,800	P G	X	0.20	—	
Edelbyn *	KIJL	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Edenton *	KECB	250	U.S. Shipping Board	300, 450, 530, 600	P G	X	0.20	—	
Edgar F. Luckenbach *	KGK	250	Luckenbach Co.	300, 450, 530, 600	P G	X	0.40	—	
Edgcombe *	WQUE	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Edgfield *	KEBF	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Edgill *	KETN	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Edgemont *	KEFD	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	

Edmore ³	KILJ	200	U.S. Shipping Board	300, 600	P G	—	0.20
Edna ³	KIPT	—	Sudden & Christenson	300, 600	P G	—	0.20
Edward J. Lawrence ³	KQY	200	French Overseas Corporation	300, 600	P G	—	—
Edward L. Doheny ³	WIE	150	Pan-Amer. Petroleum Trans. Co.	300, 450, 600	P G	—	0.20 11
Edward L. Doheny III ³	NEBX	—	Navy	300, 600	P G	—	0.40 12
Edward L. Doheny, Jr. ³	WIJ	200	Pan-Amer. Petroleum Trans. Co.	300, 450, 600	P G	—	0.20 11
Edward Luckenbach ³	KGQ	250	Luckenbach Co.	300, 450, 525, 600	P G	—	0.40 12
Edward Pierce ³	KMOU	—	Crowell & Thurlow S.S. Co.	300, 600	P G	—	0.40
Edward ³	NIGL	—	Navy	300, 600	P G	—	—
Eelbeck ³	KINQ	—	U.S. Shipping Board	300, 600	P G	—	0.20 11
Eider NIKR ³	NIKR	—	Navy	300, 600	P G	—	0.40 12
E. J. Earling ³	WEI	200	Franklin S.S. Co.	300, 600	P G	—	0.20 11
Elcano ³	NFD	—	Navy	300, 600	P G	—	0.40 12
Eldena ³	KEVG	300	U.S. Shipping Board	300, 600	P G	—	0.20
E. L. Doheny, III ³	WROO	300	U.S. Shipping Board	300, 600	P G	—	0.20
Eldora ³	KELF	—	U.S. Shipping Board	300, 600	P G	—	0.20
Eldorado ³	KMOI	—	Swayne & Hoyt	300, 600	P G	—	0.20
Eldridge ³	KICN	—	U.S. Shipping Board	300, 600	P G	—	—
Elihu Thomson ³	KEXD	150	N. Pacific Sea Products Co.	300, 600	P G	—	0.20 11
Elinor ³	KVR	200	U.S. Shipping Board	300, 600	P G	—	0.20 12
Elkhorn ³	KOCL	—	U.S. Shipping Board	300, 600	P G	—	0.40 12
Elkridge ³	KTSG	—	U.S. Shipping Board	300, 600	P G	—	0.20
Elkwater ³	KILS	—	U.S. Shipping Board	300, 600	P G	—	0.20
Ellington ³	NLN	—	Department of Labour	300, 600	P G	—	0.20
Eliot ³	NERV	—	Navy	300, 600	P G	—	0.20 11
Ellis NIFD ³	NIFD	—	Navy	300, 600	P G	—	0.40 12
Elmsport ³	KILF	300	U.S. Shipping Board	300, 600	P G	—	0.20 11
Emeline ³	NNR	—	Navy	300, 600	P G	—	0.40 12
Endicotte ³	KODN	—	U.S. Shipping Board	300, 600	P G	—	0.20 11
Englewood ³	WGAA	200	U.S. Shipping Board	300, 600	P G	—	0.40 12
Enterprise ³	WMN	—	U.S. Shipping Board	300, 600	P G	—	0.20 11
Eocene ³	KTM	300	—	300, 600	P G	—	0.40 12
Epitacio Pessoa ³	KOCC	—	U.S. Shipping Board	300, 600	P G	—	0.20 11
Ericsson ³	NIS	—	Navy	300, 600	P G	—	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum Per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Ernest H. Meyer *	WMJ	200	Broughton & Wiggins Nav. Co. . .	300, 600	P G ..	X	0.20 11 0.40 11	—	
Erny *	WLM	300	U.S. Shipping Board	300, 600	P G ..	N	0.20	—	
E. R. Sterling *	WIS	250	—	300, 565, 600	P G ..	X	—	—	
Esopus *	KETF	—	—	300, 600	P G ..	X	0.20	—	
Esparita *	KDO	300	U.S. Shipping Board	300, 450, 600	P G ..	X	0.40	—	
Esperanza *	WIO	—	—	—	—	—	—	—	
Esperanza *	KWZ	200	Esperanza Motor Shipping Co. . .	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Essex KQE *	KQE	200	—	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Eten *	KEQT	—	U.S. Shipping Board	—	—	—	—	—	
Ethelmutte *	KEMB	—	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Etin *	NEGQ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Eucharlee *	WSIU	200	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Eurana *	KJG	150	—	300, 600	P G ..	X	0.20 11 0.40 11	—	
Evangeline KII *	KII	200	—	300, 600	P G ..	N	0.20 11 0.40 11	—	
Evans *	NEMS	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Evansville *	KIKT	150	U.S. Shipping Board	300, 600	P G ..	N	0.20	—	
Evelyn KMAE *	KMAE	—	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Evelyn KZP *	KZP	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Everett *	KZI	200	—	300, 600	P G ..	X	0.20 11 0.40 11	—	
Everglades *	WQEE	—	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Excelsior *	KKO	300	—	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Explorer KIVN *	KIVN	—	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Explorer NLI *	NLI	—	Dept. of Commerce	300, 600	O ..	N	0.20 11	—	
Eyota *	KKII	200	U.S. Shipping Board	300, 600	P G ..	X	0.40 11	—	
F.2 *	NXV	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
F.3 *	NXW	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	

	NTN	Navy	P G	N	0.20 11 0.40 12 0.20
Fairfax *	WSAI	U.S. Shipping Board	300, 600	X	—
Fairfield *	KXT	U.S. Shipping Board	300, 600	X	—
Fairmont *	WMT	Parr-McCormick S.S. Lines	—	—	—
Fair Oaks *	WSM	U.S. Shipping Board	300, 600	X	—
Faith *	KJOA	Navy	300, 600	N	0.20 11 0.40 12 0.20 11 0.40 12
Falcon *	NEKN	U.S. Shipping Board	300, 600	X	0.20
Falmouth *	WKOE	U.S. Shipping Board	300, 600	X	0.20 11 0.40 12
Fame *	KEDL	Navy	300, 600	N	0.20 11 0.40 12
Fanning *	NFM	U.S. Shipping Board	300, 600	X	0.20
Faraby *	KEJV	U.S. Shipping Board	300, 600	X	0.20
Farnam *	KQJE	U.S. Shipping Board	300, 600	X	0.20
Farquhar *	NANZ	Navy	300, 600	N	0.40 11 0.40 12 0.20 11 0.40 12
Farragut *	NVS	U.S. Shipping Board	300, 600	N	0.40 12
Fassett *	KMUO	U.S. Shipping Board	300, 600	N	0.20
Favorite KIFG *	KIFG	Great Lakes Touring Co.	300, 600	X	0.10
Favorite NAJN *	NAJN	Navy	300, 600	N	0.20 11 0.40 12
Favorite WCF *	WQC	U.S. Shipping Board	300, 600	X	0.10
Fayette Brown *	WFC	Harvey H. Brown & Co.	300, 450, 600	X	0.10
F. B. Squire *	WFU	Jenkins S.S. Co.	300, 450, 600	X	0.10
F. D. Asche *	KSUA	Standard Oil Co. of N.Y.	300, 450, 600	X	0.20 11 0.40 12 0.20 11 0.40 12
Fearless *	NEKM	Navy	300, 600	N	0.20 11 0.40 12
Federal *	WDOO	U.S. Shipping Board	300, 600	X	0.20
Federal Bridge *	KOCN	U.S. Shipping Board	300, 600	X	0.20
Felix Taussig *	KXZ	Crowell & Thurlow S.S. Co.	300, 600	—	—
Feltore *	KFG	Ore S.S. Company	300, 450, 600	X	0.20 11 0.40 12 0.20 11 0.40 12
Fern *	NAFV	Navy	300, 600	N	0.40 12
Fernandina WTIA *	WTIA	U.S. Shipping Board	300, 600	X	0.20
Finback *	KEMQ	American-Arctic Corp.	300, 600	N	0.20 11 0.40 12
Finch *	NAJP	Navy	300, 600	N	0.20 11 0.40 12
Finland *	KSF	International Mercantile Marine Co.	300, 600	N	0.40 11 0.40 12
Fire Island *	KODJ	U.S. Shipping Board	300, 600	X	0.20
Firmore *	KXD	Ore S.S. Company	300, 450, 600	X	0.20 11 0.40 12
Firthcliffe *	KITF	U.S. Shipping Board	300, 600	X	0.20
Firwood *	WSB	Pacific American Fisheries	300, 450, 535, 600	X	0.20
Fish Hawk NFV *	NFV	Navy	300, 600	N	0.20 11 0.40 12
Fish Hawk WKIA *	WKIA	Fishhawk Company	300, 600	X	0.40 12 0.20 11 0.40 12
F. J. Luckenbach *	WNZ	Luckenbach Co.	300, 600	X	0.20
Flamingo *	NIJN	Navy	300, 600	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Flavel	WQVI	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Florence Luckenbach	WNM	200	Luckenbach Co.	300, 600	P G	X	0.20 11	—	
Florence Olson	WPK	—	Oliver J. Olson & Co.	300, 600	P G	—	0.40 11	—	
Florida KUS	KUS	200	Texas Company	300, 450, 600	P G	X	0.20 11	—	
Florida NFR	NFR	—	Navy	300, 600	P G	X	0.20 11	—	
Florida WJJ	WJJ	100	Goodrich Transit Co.	300, 600	P G	N	0.40 11	—	
Floridian	WLR	300	A. H. Bull S.S. Co.	300, 450, 600	P G	X	0.10	—	
Flour Spar	KIOX	—	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Folsom	WQOO	—	U.S. Shipping Board	300, 600	P G	X	0.40 11	—	
Fonduro	KNUA	200	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Foots	NWF	—	Navy	300, 600	P G	X	0.20	—	
Forandon	KRU	300	A. J. Outerbridge	300, 600	P G	N	0.20 11	—	
Forster	KKIF	—	U.S. Shipping Board	300, 600	P G	X	0.10 11	—	
Fort Bragg	WLH	—	Chas. H. Higgins	300, 600	P G	X	0.20 11	—	
Fort George	KHIA	—	U.S. Shipping Board	300, 600	P G	X	0.10 11	—	
Fort Harrison	WNQI	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Leavenworth	KEPB	—	U.S. Shipping Board	300, 600	P G	X	—	—	
Fort Logan	KLOJ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Pierce	WJUA	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Pitt Bridge	KNWB	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Riley	WNQE	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Russell	KNOW	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Scott	KNOW	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Seward	KEPJ	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Sil	KNLJ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Smelling	KNLJ	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Smith	WNQO	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort Stevens	KEBK	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fortune	NEGS	200	Navy	300, 600	P G	X	0.20	—	
Fort Wayne	WDOU	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Fort White	WVUE	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	

Fort Worth *	KLD	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Fort Wright *	KTEO	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Fourth Alabama *	KIXJ	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Fox *	KNWJ	—	Navy	300, 600	P G	..	N	0.20 11
F. Q. Barstow *	KNQ	200	Standard Oil Co. of N.J.	300, 450, 600	P G	..	X	0.40 11
Francis Hackett *	NTD	—	Navy	300, 600	P G	..	N	0.40 11
Francis L. Skinner *	WQK	200	Skinner Syndicate	300, 450, 525, 600	P G	..	X	0.20 11
Frank H. Buck *	WTO	150	Associated Oil Co.	300, 600, 1,800	P G	..	X	0.40 11
Franklin WFF *	WFF	250	Coastwise Transportation Co.	300, 450, 600	P G	..	X	—
Fred Baxter *	WOG	—	Fred Baxter S.S. Co.	300, 600	P G	..	N	0.20 11
Freedom *	NARKG	—	Navy	300, 600	P G	..	N	0.40 11
Frederick *	NJS	—	Navy	300, 600	P G	..	X	0.40 11
Frederick Luckenbach *	KGV	200	Luckenbach Co.	300, 600	P G	..	X	0.20 11
Frederic R. Kellogg *	WUQ	—	Pan-American Petroleum & Trans. Co.	300, 600	—	..	—	0.20 11
Fred J. Talbot *	NIGR	—	Navy	300, 600	P G	..	N	0.40 11
Fred W. Weller *	KNY	300	Standard Oil Co. of N.J.	300, 600	P G	..	X	0.20 11
Freeman *	WMM	—	Poehontas Fuel Co.	300, 600	P G	..	X	—
Freeport Sulphur No. 1 *	KRA	100	Freeport Sulphur Trans. Co.	300, 600	P G	..	X	0.20 11
Freeport Sulphur No. 2 *	KRG	200	Freeport Sulphur Trans. Co.	300, 600	P G	..	X	0.20 11
Fresno *	KTIO	150	U.S. Shipping Board	300, 600	P G	..	N	0.20 11
Frieda *	KFF	150	Union Sulphur Co.	300, 440, 525, 600	P G	..	X	0.40 11
Ft. Logan *	KIQJ	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Fuller *	NIFG	—	Navy	300, 600	P G	..	N	0.40
Fulton NZD *	NZD	—	Navy	300, 600	P G	..	N	0.20 11
G1 *	NXY	—	Navy	300, 600	P G	..	N	0.40 11
G2 *	NXZ	—	Navy	300, 600	P G	..	N	0.20 11
G3 *	NYA	—	Navy	300, 600	P G	..	N	0.20 11
G4 *	NYD	—	Navy	300, 600	P G	..	N	0.20 11
Gaffney *	KICR	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
G. A. Flagg *	WZEL	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Galhadi *	KEOR	300	U.S. Shipping Board	300, 600	P G	..	N	0.20
Galesburg *	WGAE	300	U.S. Shipping Board	300, 600	P G	..	N	0.20 11
Galveston *	NGD	—	Navy	300, 600	P G	..	N	0.40 11
Gamble *	NEZR	—	Navy	300, 600	P G	..	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Gannet [*]	KERL	—	U.S. Shipping Board Navy	300, 800	P G	X	Francs.	—	
Gannet [*]	NIJX	—	U.S. Shipping Board Vacuum Oil Co.	300, 800	P G	N	0.20 11	—	
Garfield [*]	WOOE	200	U.S. Shipping Board	300, 800	P G	X	0.40 12	—	
Gargoyles [*]	KRK	200	U.S. Shipping Board	300, 800	P G	X	0.20	—	
Garibaldi KROU [*]	KROU	200	U.S. Shipping Board	300, 800	P G	X	0.20 11	—	
Gene Crawley [*]	KQF	200	Sinclair Nav. Co.	300, 800	P G	X	0.40 12	—	
General Alava [*]	NAMG	—	Navy	300, 800	P G	X	0.20	—	
General A. M. Randal [*]	WYI	30	Government	600	P G	N	0.20 11	—	
General E. O. C. Ord [*]	WYF	100	Government	600	O	X	0.20 11	—	
General George H. Weeks [*]	WZI	30	Government	600	O	X	0.40 12	—	
General G. W. Gettey [*]	WYS	30	Government	600	O	X	—	—	
General G. W. Goethals [*]	KMZ	250	Panama R.R. Co.	1,200	O	X	—	—	
General Harvey Brown [*]	WYK	30	Government	300, 800	P G	X	—	—	
General Henry I. Hunt [*]	WYD	100	Government	—	O	X	0.20	—	
General Henry Knox [*]	WYE	100	Government	600	O	X	—	—	
General H. F. Hodges [*]	KPG	250	Government	600	O	X	—	—	
General J. M. Brannon [*]	WZV	30	Panama R.R. Co.	300, 800	P G	X	—	—	
General Schofield [*]	WZX	30	Government	600	O	N	0.20 11	—	
General Mifflin [*]	WZX	30	Government	600	O	X	0.40 12	—	
General Nathaniel Greene [*]	WZR	30	Government	600	O	X	—	—	
General O. H. Ernst [*]	KPF	250	Government	600	O	X	—	—	
General R. B. Ayres [*]	WYL	200	Panama R. R. Co.	600	O	X	—	—	
General R. H. Jackson [*]	WYV	20	Government	300, 800	P G	X	—	—	
General R. H. Arnold [*]	WYW	30	Government	600	O	X	—	—	
General R. N. Hatchelder [*]	WZW	30	Government	600	O	X	0.20	—	
General Robert A. Swartoot [*]	WYH	30	Government	600	O	X	—	—	
General Robert W. Swartoot [*]	WYU	25	Government	600	O	X	—	—	
General S. H. Hobbs [*]	WYX	200	Government	600	O	X	—	—	
General S. N. Mills [*]	WYH	200	Government	600	O	X	—	—	

General	S. B. Holo-	WYV	30	Government	600	O	X
General S. B. Holo-	WYB	200	Government	600	O	—	—
General S. N. Mills *	WZQ	200	Government	600, 1,200	O	—	—
General Timethy	WZQ	200	Government	600, 1,200	O	—	—
General W. C. Gorgas *	KIP	250	Panama R.R. Co. ..	300, 600	P G	—	—
General William M. Graham *	WEY	—	Government	300, 600	P G	—	—
Genesee KIDL *	KIDL	300	W. K. Vanderbilt, Jr.	300, 450, 600	P G	—	—
Genesee NKG *	NKG	—	Navy	300, 600	P G	—	—
Geo. E. Badger *	NUJG	—	Navy	300, 600	P G	—	—
Geo. G. Henry *	WIT	150	Pan-Amer. Petroleum Trans. Co.	300, 600	P G	—	—
Geo. H. Jones *	KIPS	300	U.S. Shipping Board	300, 600	P G	—	—
Georgia KUR *	KUR	200	Texas Company	300, 450, 600	P G	—	—
Georgia NGF *	NGF	—	Navy	300, 600	P G	—	—
Georgia WFA *	WFA	150	Goodrich Trans. Co.	300, 600	P G	—	—
Georgina Rolph	KETX	—	Rolph Nav. & Coal Co. ..	300, 600	P G	—	—
Geo. Washington *	NEC	—	Navy	300, 600	P G	—	—
Geo. W. Barnes *	KMUI	—	Pan-Amer. Petroleum Trans. Co.	300, 600	P G	—	—
Geo. W. Elder *	WRT	150	—	300, 600	P G	—	—
Gillis *	NERR	—	Navy	300, 600	P G	—	—
Gilmer *	NERB	—	Navy	300, 600	P G	—	—
Glacier *	NGH	—	Navy	300, 600	P G	—	—
Glendola *	KFAI	200	U.S. Shipping Board	300, 600	P G	—	—
Glendoyle *	KFAO	200	U.S. Shipping Board	300, 600	P G	—	—
Glennpool *	KOH	300	Standard Oil Co. of N.J.	300, 450, 600	P G	—	—
Glen Ridge *	KIRZ	—	U.S. Shipping Board	300, 600	P G	—	—
Glen White *	KSIE	—	U.S. Shipping Board	300, 600	P G	—	—
Glorieta *	KIC	200	U.S. Shipping Board	300, 600	P G	—	—
Gloucester KQG *	KQG	150	Merchants & Miners Trans. Co. ..	300, 600	P G	—	—
Gloucester NSL *	NSL	—	Navy	300, 600	P G	—	—
Glymont *	KEKZ	—	U.S. Shipping Board	300, 600	P G	—	—
Glyndon *	KEZQ	—	U.S. Shipping Board	300, 600	P G	—	—
Goldborough *	NGJ	—	Navy	300, 600	P G	—	—
Gold Shell *	WIE	250	Gold Shell S.S. Co.	300, 450, 600	P G	—	—
Goliath NPY *	NPY	—	Navy	300, 600	P G	—	—
Gonzalia *	KOBQ	—	U.S. Shipping Board	300, 600	P G	—	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range In Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Goodspeed *	WKEO	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Gopher *	NNY	—	Navy	300, 600	P G	N	0.20 11	—	
Goree *	WLIH	200	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
Gorgona *	NDJ	—	Navy	300, 600	P G	N	0.20	—	
Govan *	WLAO	—	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Governor WGR *	WGR	300	Pacific Coast Co. ..	300, 450, 600	P G	X	0.40 12	—	
Governor Brooks *	KPZ	250	France & Canada S.S. Corporation	300, 450, 600	P G	N	0.20	—	
Governor Cobb *	KRB	200	Eastern S.S. Lines	300, 600	P G	X	0.20 11	—	
Governor Dingley *	KRV	200	Eastern S.S. Lines	300, 600	P G	N	0.40 12	—	
Governor John Lind *	WRUE	300	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Graf Waldersee *	NIVF	—	Navy	300, 600	P G	X	0.40 12	—	
Graham *	NAGJ	—	Navy	300, 600	P G	N	0.20	—	
Grand Haven *	KEXR	—	Grand Trunk Car Ferry Line	—	—	N	0.40 12	—	
Gratin *	KIGP	—	French-American Line	—	—	—	—	—	
Gray Cloud *	KEZV	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Gray Eagle *	KEZT	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Grayling *	KEVL	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Great Northern *	WIR	150	Army	300, 450, 600	P G	X	0.20 11	—	
Grebe NIKX *	NIKX	—	Navy	300, 600	P G	N	0.40 12	—	
Greclan *	KQR	150	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 11	—	
Greene *	WIGM	—	Navy	300, 600	P G	N	0.40 12	—	
Greenwood *	WLL	—	Greenwood S.S. Co.	300, 600	P G	N	0.20 11	—	
Green *	NERT	—	Navy	300, 600	P G	N	0.40 12	—	
Gregory NAJR *	NAJR	—	Navy	300, 600	P G	N	0.20 11	—	
Greyside *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.40 12	—	
Griffin *	WVIR	—	Navy	300, 600	P G	N	0.20 11	—	
Griffin *	WV								

Guantanamo *	250	N.Y. & Cuba S.S. Co.	300, 450, 600	P G	N	0.40 11 0.20 11 0.40 13 0.20 11 0.40 13 0.20
Guard *	—	Navy	300, 600	P G	N	0.40 11 0.20 11 0.40 13 0.20
Guardian *	200	Central & S. American Telegraph Co.	300, 600	P G	X	0.20
Guardsman *	—	U.S. Shipping Board	300, 600	P G	X	0.20
Guaro *	150	U.S. Shipping Board	300, 600	P G	X	0.20
Guilford *	300	U.S. Shipping Board	300, 600	P G	N	0.20
Guimba *	300	U.S. Shipping Board	300, 600	P G	N	0.20
Gulfcoast *	200	Gulf Refining Co. ..	300, 600	P G	X	0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulfland *	—	—	—	—	—	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulflight *	200	Gulf Refining Co. ..	300, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulfmaid *	200	Gulf Refining Co. ..	300, 450, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulf of Mexico *	200	Gulf Refining Co. ..	300, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulfoil *	200	Gulf Refining Co. ..	300, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulport *	200	Freeport & Tampico Fuel Oil Trans. Co.	300, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulf Queen *	—	Gulf Refining Co. ..	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gulfstream *	250	Gulf Refining Co. ..	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gunston Hall *	300	U.S. Shipping Board	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gut Heil *	—	U.S. Shipping Board	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gwin *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Gypsum Queen *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 1 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 2 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 3 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 4 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 5 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 6 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 7 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 8 *	—	Navy	330, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
H 9 *	—	Navy	300, 600	P G	N	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Haddon *	—	U.S. Shipping Board	300, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13
Halcyon *	100	D. W. Flint	300, 450, 600	P G	X	0.40 13 0.20 11 0.40 13 0.20 11 0.40 13 0.20 11 0.40 13

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Frans.	Frans.	
Hale	NACL	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hamilton KOA *	KOA	200	Old Dominion S.S. Co. ..	300, 450, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hamilton NIFL *	NIFL	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hampton	WXUI	300	Coastwise Transportation Co. ..	300, 600	P G ..	X	—	—	
Hampton Roads *	KESR	—	U.S. Shipping Board ..	—	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hancock	NHI	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hannibal	NGU	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Haraden	NEXZ	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Harding	NEMV	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Harish	WSIE	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	—	
Harney	KQAE	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	—	
Harold Walker *	WIX	200	Petroleum-Transport Co. ..	300, 450, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Harrisburg	NAKF	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Harry Farnum *	KQA	300	Sinclair Nav. Co. ..	300, 450, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Harry W. Croft *	WQF	200	Harvey H. Brown & Co. ..	300, 450, 600	P G ..	X	0.10	—	
Harstele	KEW	100	J. H. W. Steele Co. ..	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hart	NENV	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hartford	NGV	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hartwood	KEVR	—	Hart-Wood Lumber Co. ..	—	P G ..	N	—	—	
Harvard	NMT	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Harvester (The) *	WCR	200	International Harvester Co. ..	300, 600	P G ..	X	0.10	—	
Hatch	WQB	200	Criswell, Curran & Bullitt ..	300, 450, 600	P G ..	X	0.10	—	
Hatchel	KQJ	—	U.S. Shipping Board ..	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Hathfield	NEAV	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	

Hatteras *	200	WNF	Luckenbach Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Hattie Luckenbach *	200	WLU	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Haverhill *	200	WLU	Amer.-Hawaiian S.S. Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Hawaiian *	200	WLU	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Hawk NFW *	..	NFW	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Hawk NSM *	..	NSM	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Hazelton *	..	NEFB	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Hazelwood *	..	NENS	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
H. C. Cadmus *	200	KVT	Neptune Line	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
H. C. Folger *	250	KHS	Atlantic Refining Co.	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Heather *	..	NAKL	Bureau of Lighthouses	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Hector NGX *	..	NGX	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Heffron *	..	WBAI	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Hegira *	300	KIDF	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Helen *	200	KZH	Bull-Insular S.S. Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Helena *	..	NGY	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Henderson *	..	NOH	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Henley *	..	NHA	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Henry Clay *	..	KESZ	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Henry J. Biddle *	250	WOW	Western Fuel Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Henry M. Flagler *	200	KOX	Florida E. Coast Car Ferry Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Henry R. Mallory *	250	KEF	—	..	..	300, 450, 600	P G	..	N	0.20 11 0.40 12
Henry Wilson *	30	WZS	Government	..	..	600	O	..	X	0.20 11 0.40 12
Henshaw *	..	NUJQ	Navy	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Herbert *	..	NEMJ	—	..	..	—	—	..	—	0.20 11 0.40 12
Herbert G. Wyllie *	350	WIF	Pan-Amer. Petroleum & Trans. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.40 12
Herbert L. Pratt *	..	KOY	Atlantic Refining Co.	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Hercules KOCT *	..	NEKR	Rolph Nav. & Coal Co.	..	..	—	—	..	—	0.20 11 0.40 12
Hercules NEKR *	..	NEKR	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Hercules WOE	150	WOE	United Fruit Co.	..	..	300	P	..	X	0.40
Heredia *	500	KDHO	Eastern S.S. Lines	..	..	300, 600	P G	..	N	0.40
Herman Winter *	..	WDAO	Wilmington Trans. Co.	..	..	300, 600	P G	..	X	0.05 0.20 11 0.40 12
Hermosa *	150	WBP	Navy	..	..	300, 600	P G	..	N	0.05 0.20 11 0.40 12
Herridon *	..	NENJ	..	..	..	300, 600	P G	..	N	0.05 0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Heron ..	NENL	—	Navy	300, 600	P G ..	N	Francs. —	Francs. —	
Hewitt ..	KIL	250	Union Sulphur Co. ..	300, 600	P G ..	X	— 11	— 11	
H. F. Dimock ..	KEN	200	Eastern S.S. Lines ..	300, 600	P G ..	X	0.20 12	0.40 12	
H. H. Rogers ..	KSI	300	Standard Oil Co. of N.J. ..	300, 450, 600	P G ..	X	0.20 12	0.40 12	
Hibiscus ..	NAKN	—	Navy	300, 600	P G ..	N	0.20 11	0.40 12	
Hickman ..	WFOA	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20 12	0.40 12	
Hico ..	KECK	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Hiddenite ..	WPEO	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Hillsborough County ..	KIKB	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Hilton ..	KZK	—	A. H. Bull S.S. Co. ..	300, 600	—	—	0.20 11	0.20 11	
Himoto ..	KILC	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20 12	0.40 12	
Hisko ..	WQD	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
H. Luckenbach ..	NALF	—	Navy	300, 600	P G ..	N	0.20 11	0.20 11	
H. M. Flagler ..	KER	400	Standard Oil Co. of N.J. ..	300, 450, 600	P G ..	X	0.20 11	0.40 12	
H. M. Whitney ..	WPV	—	Acme S.S. Co. ..	—	—	—	0.20 11	0.40 12	
Hogan ..	NEXT	—	Navy	300, 600	P G ..	N	0.20 11	0.40 12	
Hog Island ..	KODV	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Hokah ..	WJAE	150	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Holbrook WQII ..	WQII	200	U.S. Shipping Board ..	300, 600	P G ..	X	0.20	0.20	
Holden Evans ..	KMY	150	Holden A. Evans S.S. Co. ..	300, 600	P G ..	X	0.20 11	0.40 12	
Hollywood ..	WKH	250	Pacific-Amer. Fisheries ..	300, 450, 600	P G ..	X	0.20 11	0.40 12	
Homestead ..	KEKR	300	U.S. Shipping Board ..	300, 600	P G ..	N	0.40 12	0.40 12	
Honolulu ..	WMZ	100	U.S. Shipping Board ..	300, 600	P G ..	N	0.20	0.20	
Hosac ..	WQAU	—	U.S. Shipping Board ..	300, 600	P G ..	N	0.20	0.20	
Hopewell ..	NEXX	—	Navy	300, 600	P G ..	N	0.20 11	0.40 12	
Hopkins ..	NHIC	—	Navy	300, 600	P G ..	N	0.20 11	0.40 12	

Hoven ⁷	..	KEXV	—	U.S. Shipping Board	..	300, 800	P G	X	0.20
Hovey ⁸	..	NEPB	—	Navy	..	300, 800	P G	N	0.20 11
Howard KQH ⁸	..	KQH	200	Merchants & Miners Trans. Co.	..	300, 450, 800	P G	N	0.40 12
Howard NIFM ⁸	..	NIFM	—	Navy	..	300, 800	P G	N	0.40 12
Howick Hall ⁸	..	KLT	200	U.S. Steel Products Co.	..	300, 800	P G	X	0.20 11
Hoxbar ⁷	..	KIJQ	—	U.S. Shipping Board	..	300, 800	P G	X	0.40 12
Hoxie ⁸	..	KEMK	300	U.S. Shipping Board	..	300, 800	P G	X	0.20
Huachuca ⁸	..	KIMX	300	U.S. Shipping Board	..	300, 800	P G	X	0.20
Hubbard ⁸	..	NDX	—	Navy	..	300, 800	P G	N	0.20 11
Hugaton ⁸	..	KIOR	—	U.S. Shipping Board	..	300, 800	P G	X	0.40 12
Huguenot ⁸	..	KIVQ	—	U.S. Shipping Board	..	300, 800	P G	X	0.20
Hukley ⁸	..	KIFC	—	U.S. Shipping Board	..	300, 800	P G	X	0.20
Hulaco ⁸	..	KODO	—	U.S. Shipping Board	..	300, 800	P G	X	0.20 11
Hulbert ⁸	..	NUKD	—	Navy	..	300, 800	P G	N	0.20 12
Hull ⁸	..	NHE	—	Navy	..	300, 800	P G	N	0.40 12
Hulver ⁸	..	KIGD	150	U.S. Shipping Board	..	300, 800	P G	X	0.20
Humacenna ⁷	..	KIGC	150	U.S. Shipping Board	..	300, 800	P G	X	0.20 11
Humbolt ⁸	..	WHX	100	Humboldt S.S. Co.	..	300, 800	P G	N	0.40 12
Humphreys ⁸	..	NURX	—	Navy	..	300, 800	P G	N	0.20 11
Humrick ⁸	..	KIFN	—	U.S. Shipping Board	..	300, 800	P G	X	0.40 12
Hunt ⁸	..	NUJF	—	Navy	..	300, 800	P G	N	0.20 11
Huntington ⁸	..	NWVG	—	Navy	..	300, 800	P G	N	0.40 12
Huron KVH ⁸	..	KVH	300	Clyde S.S. Co.	..	300, 800	P G	N	0.20 11
Huron WCH ⁸	..	WCH	100	Huron S.S. Co.	..	300, 500, 800	P G	X	0.40 12
Hyacinth ⁸	..	NAGV	—	Navy	..	300, 800	P G	N	0.20 11
Hyades ⁸	..	WMK	200	Matson Nav. Co.	..	300, 450, 800	P G	X	0.40 12
Hyannis ⁸	..	KINC	—	U.S. Shipping Board	..	300, 800	P G	X	0.20
Ice King ⁸	..	KIUA	—	U.S. Shipping Board	..	300, 800	P G	X	0.20
Icington ⁷	..	WQUO	—	U.S. Shipping Board	..	300, 800	P G	N	0.20
Ida WLV ⁸	..	WLV	250	U.S. Shipping Board	..	300, 450, 800	P G	N	0.20 11
Idaho NHN ⁸	..	NHN	—	Navy	..	300, 800	P G	N	0.40 12
Idaho WOO ⁸	..	WOO	200	Wilson Bros. & Co.	..	300, 800	P G	X	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
Idell	KESV	—	U.S. Shipping Board	300, 600	P G	X	Francs.	Francs.	
I. D. Fletcher	KFI	200	Coast Transit Co.	300, 600	P G	X	0.20 11	—	
Illinois	NHO	—	Navy	300, 600	P G	N	0.10 11	—	
Illinois WCZ	WCZ	150	Northern Mich. Transportation Co.	300, 600	P G	X	0.20 11	—	
Imlay	KIZV	—	U.S. Shipping Board	300, 600	P G	X	0.40 11	—	
Imperator	NIVM	—	Navy	300, 600	P G	N	0.20 11	—	
Imufka	KEDS	—	U.S. Shipping Board	300, 600	P G	X	0.40 11	—	
Inco No. 1	WQA	150	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Independence	WJIO	—	U.S. Shipping Board	300, 450, 600	P G	N	0.20	—	
Indiana WFC	WFC	100	Goodrich Transit Co.	300, 600	P G	X	0.10	—	
Indianapolis	WROE	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Ingold	WLUU	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Ingraham	NENX	—	Navy	300, 600	P G	N	0.20 11	—	
Ingram	NIGF	—	Navy	300, 600	P G	N	0.20 11	—	
Innoko	KITJ	—	U.S. Shipping Board	300, 600	P G	N	0.40 11	—	
Intan	KIGK	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Invincible	WCII	300	—	300, 600	P G	N	0.20	—	
Iowa	NHI	—	Navy	300, 600	P G	N	0.20 11	—	
Iowan	WKJ	250	Amer.-Hawaiian S.S. Co.	300, 600	P G	X	0.40 11	—	
Ipswich	KILV	300	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Iris WOJ	WOJ	200	U.S. Shipping Board	300, 450, 600	P G	X	0.40 11	—	
Iroquois KVF	KVF	300	Clyde S.S. Co.	300, 450, 600	P G	N	0.20 11	—	
Iroquois NHV	NHV	—	Navy	300, 600	P G	N	0.40 11	—	
Irtysch	KREU	—	U.S. Shipping Board	300, 600	P G	X	0.40 11	—	
Isaac L. Rice	WKK	—	Electric Boat Co.	600, 820	P G	N	0.20	—	
Isabel	NHP	—	Navy	600, 820	P G	N	0.20 11	—	
Isabel	KGV	—	Navy	600, 820	P G	N	0.40 11	—	

Ietas *	..	WPEI	—	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Itacca *	..	NRI	200	300	U.S. Coastguard Dept.	..	300, 600	P G	..	N	0.20
Itanca *	..	WGUE	200	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11
Itompa *	..	KENR	200	300	Nacirema S.S. Corporation	..	300, 600	P G	..	X	0.40 12
Ituna *	..	WPA	300	300	—	..	300, 600	P G	..	X	0.20 11
Iuka *	..	NEVR	—	300	Navy	..	300, 600	P G	..	N	0.40 12
Ivy *	..	NAKV	—	300	Navy	..	300, 600	P G	..	N	0.40 12
Iwana *	..	NTV	—	300	Navy	..	300, 600	P G	..	N	0.40 12
J. A. Bostwick *	..	KJN	400	300, 450, 600	Standard Oil Co. of N.J.	..	300, 450, 600	P G	..	X	0.20 11
J. A. Chansler *	..	WTK	150	300, 600, 1,800	Assoc. Oil Company	..	300, 600, 1,800	P G	..	X	0.40 12
Jackson ?	..	KIKC	—	300, 600	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11
Jacob Jones *	..	NEPC	—	300, 600	Navy	..	300, 600	P G	..	X	0.40 12
Jacona ?	..	WQUU	300	300, 600	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Jacox *	..	KEML	—	300, 600	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11
James K. Paulding *	..	MUJM	—	300, 600	Navy	..	300, 600	P G	..	N	0.40 12
James McGee *	..	KTP	—	300, 450, 600	Standard Oil Co. of N.J.	..	300, 450, 600	P G	..	X	0.20 11
James S. Whitney *	..	WPW	—	300, 600	U.S. Shipping Board	..	300, 600	P G	..	X	0.40 12
James Timpson *	..	WTA	200	300, 600	Ichabod S. Williams & Sons	..	300, 600	P G	..	X	0.20 11
Jamestown *	..	KOC	200	300, 450, 600	Old Dominion S.S. Co.	..	300, 450, 600	P G	..	N	0.40 12
J. A. Moffett *	..	WRE	150	300, 600, 1,610, 1,800	Standard Oil Co. of Calif.	..	300, 600, 1,610, 1,800	P G	..	X	0.20 11
Jane Palmer *	..	KPY	200	300, 450, 600	W. India Super Corp.	..	300, 450, 600	P G	..	X	0.40 12
Jarvis *	..	NIB	—	300, 600	Navy	..	300, 600	P G	..	N	0.20 11
Jason KNJ *	..	KNJ	200	300, 600	Jason Nav. Co.	..	300, 600	P G	..	X	0.40 12
Jason NNB *	..	NNB	—	300, 600	Navy	..	300, 600	P G	..	N	0.20 11
J. B. Stetson *	..	WVUE	200	300, 600	Pacific Mercantile Marine Co.	..	300, 600	P G	..	X	0.40 12
J. C. Donnell *	..	WJM	—	300, 600	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11
Jean *	..	KZJ	—	300, 600	A. H. Bull S.S. Co.	..	300, 600	P G	..	X	0.40 12
Jeanette Skinner *	..	WQW	300	300, 450, 525, 600	U.S. Shipping Board	..	300, 450, 525, 600	P G	..	X	0.20

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.							Frans.	Frans.	
Jefferson KOD ¹	KOD	200	Old Dominion S.S. Co.	300, 450, 600	P G	N	0.20 11 0.40 12	—	
Jefferson WAJ ¹	WAJ	100	Alaska S.S. Co.	300, 600	P G	N	0.20 11 0.40 12	—	
Jefferson County ¹	KKF	1,000	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Jekyl ¹	KEBS	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Jenkins ¹	NID	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
J. E. O'Neil ¹	KSB	300	Atlantic Refining Co.	300, 600	P G	X	0.20 11 0.40 12	—	
Jim Butler ¹	AVIL	150	Olson & Mahong	300, 600	P G	X	0.10 12 0.20 11	—	
J. L. Luckenbach ¹	KGT	200	Luckenbach Company	300, 600	P G	N	0.40 11	—	
J. M. Danziger ¹	WIW	250	Pan.-Amer. Petroleum & Trans. Company	300, 600	P G	X	0.20 11	—	
J. M. Guffey ¹	KTF	200	Gulf Refining Co.	300, 600	P G	X	0.20 11	—	
Joan of Arc ¹	KETV	200	Rolph Nav. & Coal Co.	300, 600	P G	X	0.20 11 0.40 12	—	
Johanna Smith ¹	WHZ	150	Coos Bay Lumber Co.	300, 600	P G	X	0.20 11 0.40 12	—	
John B. Hinton ¹	NDZ	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
John D. Rockefeller ¹	KTO	200	Standard Oil Co. of N.J.	300, 600	P G	X	0.20 11 0.40 12	—	
John Ena ¹	KIRS	200	Robert Dollar Co.	300, 600	P G	X	0.20 11 0.40 12	—	
John Francis Burns ¹	NIGQ	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
John F. Reiss ¹	WNY	200	N. American S.S. Co.	300, 600	P G	X	0.10	—	
John M. Connelly ¹	KJEI	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Johnson City ¹	KIKD	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Jonancy ¹	KSEU	—	Poehonkas Fuel Co.	300, 600	P G	X	0.20	—	
Joseph Henry ¹	WXT	100	Government	600	O	X	—	—	
Joseph R. Parrott ¹	KJP	200	Florida E. Coast Car Ferry Co.	300, 450, 600	P G	X	0.20 11 0.40 12	—	
Joshua May ¹	KJ-X	300	Standard Oil Co. of N. E.	300, 450, 600	P G	X	0.20 11 0.40 12	—	

Juno KSUE	KSUE	—	Navy	—	300, 600	PG	—	—	0.20 11
Jupiter NNC	NNC	—	—	—	—	—	—	—	0.40 12
J. W. McGrath	KXIA	—	Atlantic Refining Co.	—	300, 450, 600	PG	—	—	0.20 11
J. W. Van Dyke	KHR	250	—	—	—	—	—	—	0.40 12
K1	NYF	—	Navy	—	300, 600	PG	—	—	0.20 11
K2	NYG	—	Navy	—	300, 600	PG	—	—	0.40 12
K3	NYH	—	Navy	—	300, 600	PG	—	—	0.20 11
K4	NYI	—	Navy	—	300, 600	PG	—	—	0.40 12
K5	NYJ	—	Navy	—	300, 600	PG	—	—	0.20 11
K6	NYK	—	Navy	—	300, 600	PG	—	—	0.40 12
K7	NYL	—	Navy	—	300, 600	PG	—	—	0.20 11
K8	NYM	—	Navy	—	300, 600	PG	—	—	0.40 12
Kaiserin Augusta	NIVJ	—	Navy	—	300, 600	PG	—	—	0.20 11
Kalk	NIGD	—	Navy	—	300, 600	PG	—	—	0.40 12
Kalmia	NAZS	—	Navy	—	300, 600	PG	—	—	0.20 11
Kamaydin	NAXN	—	Navy	—	300, 600	PG	—	—	0.40 12
Kamesit	KEDG	—	U.S. Shipping Board	—	300, 600	PG	—	—	0.20 11
Kanabec	WMIH	—	French-American Line	—	300, 600	PG	—	—	0.40 12
Kanak	KOT	150	Alaska Packers Association	—	300, 400, 600	PR	—	—	0.20
Kanakanak	KGU	—	U.S. Shipping Board	—	300, 600	PG	—	—	0.20 11
Kanakee	WVUU	200	U.S. Shipping Board	—	300, 600	PG	—	—	0.40 12
Kanawha KYA	KYA	—	John Borden	—	300, 600	PG	—	—	0.20
Kanawha NND	NND	—	Navy	—	300, 600	PG	—	—	0.20
Kane	NULM	—	Navy	—	300, 600	PG	—	—	0.20 11
Kangi	WRUA	—	U.S. Shipping Board	—	300, 600	PG	—	—	0.40 12
Kankankee	NUMZ	200	U.S. Coastguard Dept.	—	300, 600	PG	—	—	0.20
Kansas NIO	NIO	—	Navy	—	300, 600	PG	—	—	0.20 11
Karina	KYR	—	T. P. Burgess	—	—	—	—	—	0.40 12

Kilkenny KKI *	100	Bureau of Navigation	300, 450, 600	O	..	X	0.40
Kilpatrick *	300	Army Transport	600	P G	..	N	0.20 11
Kilty *	—	Navy	300, 600	P G	..	N	0.40 12
K. I. Luckenbach *	—	Luckenbach Company	—	—	—	—	—
Kimberly *	—	Navy	300, 600	P G	..	N	0.20 11
Kimta *	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Kineo *	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
King *	—	Navy	330, 600	P G	..	N	0.20 11
Kingfisher KMAO *	—	E. Coast Fisheries Co.	300, 600	P G	..	X	0.40 12
Kingfisher NALP *	—	Navy	300, 600	P G	..	N	—
Kinta *	—	U.S. Shipping Board	300, 600	P G	..	X	0.20 11
Kiokee *	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Kiowa *	150	Atlantic Gulf and W. Indies S.S. Lines	300, 600	P G	..	X	0.20
Kiron *	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Kishacacuilas *	300	U.S. Shipping Board	300, 600	P G	..	X	0.20
Kisnop *	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Kitchi *	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Kittegaun *	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Kittery *	—	Navy	300, 600	P G	..	N	0.20 11
Kivassin *	—	Navy	300, 600	P G	..	N	0.40 12
Klamath WMOU *	200	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Klamath WSX *	150	Klamath S.S. Co.	300, 600	P G	..	N	0.20
Knaves Island *	—	U.S. Shipping Board	300, 600	P G	..	X	0.20 11
Knoxville *	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Koka *	—	U.S. Shipping Board	300, 600	P G	..	N	0.20
Kokomo *	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Koningen der Nederlanden *	—	Navy	300, 600	P G	..	N	0.20 11
Kroonland *	200	Internat. Mercantile Marine Co.	300, 600	P G	..	N	0.40 12
Kukui *	100	Bureau of Lighthouses	300, 600	P G	..	X	0.20 11
Kusdeca *	200	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Kuwa *	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Kvichak *	300	Alaska Packers Assn.	300, 600	P G	..	X	0.20 11
Li *	—	Navy	300, 600	P G	..	N	0.40 12

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Lake Folcroft ⁶	KEXL	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fond ⁶	KEZC	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fondulac ⁶	WSEO	150	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fontana ⁶	KEZD	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fontanet ⁶	KEZF	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Forest ⁶	KBII	100	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Forkville ⁶	WLEI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Forney ⁶	WBUU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Forsby ⁶	WCUA	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fossil ⁶	WCUE	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fostoria ⁶	WPJO	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fouché ⁶	WPJU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Foxboro ⁶	KESB	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Foxcraft ⁶	KEGL	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fraichur ⁶	KEJG	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fraley ⁶	KEJJ	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frampton ⁶	WCUI	150	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frances ⁶	KTAO	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Franconia ⁶	WCUC	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fray ⁶	WCUT	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frazee ⁶	WDUA	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frecks ⁶	KENT	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Freeborn ⁶	WDUI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Freed ⁶	WDUU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Freeland ⁶	WFUA	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Freezout ⁶	WFUE	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frenchton ⁶	WNAU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fresco ⁶	KEFN	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Friar ⁶	KEFP	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fro ⁶	KEGR	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frohna ⁶	KEGN	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frohono ⁶	KEGP	300	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frugality ⁶	KIRI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Frumet ⁶	WLEU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Fugard ⁶	WMAA	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Furley ⁶	KEKP	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Furlough ⁶	KITP	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gadsden ⁶	KVOU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gakona ⁶	KXAI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Galera ⁶	KXEO	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gardner ⁶	KVOE	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Garza ⁶	KVOI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gasper ⁶	KIPN	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gazette ⁶	KVUO	200	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Gedney ⁶	KXUA	150	U.S. Shipping Board	300, 600	P G	X	0.20
Lake Geneva ⁶	KBEO	100	U.S. Shipping Board	300, 600	P G	X	0.20
Lake George ⁶							

Lake Inglenook ⁶	—	U.S. Shipping Board	300, 600	0.20	X
Lake Janet ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Jessup ⁷	—	U.S. Shipping Board	300, 600	0.20	X
Lake Kyttle ⁷	150	U.S. Shipping Board	300, 600	0.20	X
Lakeland KBOU ⁶	100	U.S. Shipping Board	300, 600	0.20	X
Lakeland WDL ⁶	100	North-Western S.S. Co.	300, 600	0.20	X
Lake Larga ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Lasang ⁷	—	U.S. Shipping Board	300, 600	0.20	X
Lake Ledan ⁷	150	U.S. Shipping Board	300, 600	0.20	X
Lake Lemando ⁶	—	U.S. Shipping Board	300, 600	0.20	X
Lake Lesa ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Licking ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Licoco ⁷	—	U.S. Shipping Board	300, 600	0.20	X
Lake Lida ⁸	200	U.S. Shipping Board	300, 600	0.20	X
Lake Liliusun ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Lillian ³	150	U.S. Shipping Board	300, 600	0.20	X
Lake Linden ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Louise ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Marion ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Markham ³	150	U.S. Shipping Board	300, 600	0.20	X
Lake Mary ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Mattato ³	100	U.S. Shipping Board	300, 600	0.20	X
Lake Maurepas ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Medford ³	—	U.S. Shipping Board	300, 600	0.20	X
Lake Michigan ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Mohonk ⁷	100	U.S. Shipping Board	300, 600	0.20	X
Lake Monroe ³	—	U.S. Shipping Board	300, 600	0.20	X
Lake Narka ³	150	U.S. Shipping Board	300, 600	0.20	X
Lake Ogden ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Onaida ⁷	150	U.S. Shipping Board	300, 600	0.20	X
Lake Ontario ³	100	U.S. Shipping Board	300, 600	0.20	X
Lake Orange ³	150	U.S. Shipping Board	300, 600	0.20	X
Lake Ormoc ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Osweya ³	150	U.S. Shipping Board	300, 450, 600	0.20	X
Lake Otisco ³	—	U.S. Shipping Board	300, 600	0.20	X
Lake Otusquago ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Pachuta ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lake Pearl ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Pepin ³	150	U.S. Shipping Board	300, 600	0.20	X
Lake Pewaukee ³	—	U.S. Shipping Board	300, 600	0.20	X
Lake Pickaway ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Pleasant ⁷	200	U.S. Shipping Board	300, 600	0.20	X
Lakeport WDI ⁷	100	U.S. Shipping Board	300, 600	0.20	X
Lakeport WOQ ³	100	U.S. Shipping Board	300, 600	0.10	X
Lake Saba ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Sanford ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Sapor ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Savus ³	—	U.S. Shipping Board	300, 600	0.20	X
Lake Sebago ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Shawano ³	200	U.S. Shipping Board	300, 600	0.20	X
Lakeshore ³	100	U.S. Shipping Board	300, 600	0.20	X
Lake Seaside ³	100	U.S. Shipping Board	300, 600	0.20	X
Lake Silver ³	200	U.S. Shipping Board	300, 600	0.20	X
Lake Singara ⁷	300	U.S. Shipping Board	300, 600	0.20	X
Lake St. Clair ⁷	150	U.S. Shipping Board	300, 600	0.20	X

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per-Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Lake Sterling*	KBUE	—	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Lake Stobi*	KISZ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Strabo*	KEBR	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake St. Regis*	KLEE	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Sunapee*	KLIU	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Superior*	KBAB	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Traverse*	KBUA	—	Amer.-Hawaiian S.S. Co.	300, 600	P G	X	0.20	—	
Lake Tulare*	WDK	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lakeview*	KBEE	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Ville*	KXEU	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
Lake Washburn*	KREI	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Weir*	KBEA	200	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Lake Weston*	NETP	—	Navy	300, 600	P G	N	0.20 11	0.40 11	
Lake Wilson*	KZAO	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Winico*	KSOU	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Winona*	KLAI	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Winoski*	KZIE	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Winthrop*	KZAI	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lakewood KBOO*	KBOO	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lakewood WDK	WDK	100	—	300, 600	P G	X	0.20	—	
Lake Worth*	KBIE	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Yahara*	KZAU	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Yelverton*	KVOO	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Yemassee*	KTOO	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Ypsilanti*	WKEI	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lake Zaliski*	WKAI	200	U.S. Shipping Board	300, 600	P G	X	0.20 11	0.40 11	
Lamberton*	NAZL	—	Navy	300, 600	P G	N	0.20 11	0.40 11	
Lambs (The)*	KEBZ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Lampasas*	KEP	200	Malory S.S. Co.	300, 450, 600	P G	N	0.20 11	0.40 11	
Lancaster KOUE*	KOUE	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Lancaster NEW*	NEW	—	Navy	300, 600	P G	N	0.20 11	0.40 11	
Lanadale*	NERL	—	Navy	300, 600	P G	N	0.20 11	—	
Lansing*	WTC	150	Union Oil Co. of Calif.	300, 600, 1,800	P G	X	0.20 11	0.40 11	

Lapwing ⁹	..	NALC	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11
Laramie ⁹	..	NUGL	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Larimer ³	..	KTA	—	Gulf Refining Co.	..	..	..	300, 600	P G	..	X	0.20 11
Lark ⁹	..	NIJK	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Larkspur ⁶	..	NAMB	—	Bureau of Lighthouses	..	..	..	300, 600	P G	..	N	0.40 13
Lassell ⁶	..	KMEA	—	D. H. E. Jones	..	..	..	300, 600	P G	..	X	0.20
Latoka ⁷	..	WLUA	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11
Latouche ⁷	..	WAI	100	Alaska S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11
Laub ⁹	..	NIGJ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Laurel ⁶	..	NALV	—	Bureau of Lighthouses	..	..	..	300, 600	P G	..	N	0.20
Laurel WTUE ³	..	WTUE	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11
Lawrence ⁹	..	NIY	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Lea ⁹	..	NETF	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Leary ⁹	..	NAFL	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Lebanon KIXL ³	..	KIXL	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.40 13
Lebanon NIZ ⁹	..	NIZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11
Lehigh ⁷	..	KINM	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.40 13
Lenape ³	..	KVL	200	Clyde S.S. Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11
Leonidas ⁹	..	NNH	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Leviathan ⁹	..	NEJ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 13
Levi, G. Burgess ³	..	WCX	200	Alaska-Portland Packers Assn.	..	..	..	300, 450, 600	P G	..	N	0.40 13
Leviss ⁹	..	KDL	300	United Fruit Co.	..	..	..	300, 600	P G	..	X	0.40
Lewis K. Thurlow ⁶	..	KXY	200	Crowell and Thurlow S.S. Co.	..	..	..	300, 450, 600	P G	..	X	0.40
Lewis Luckenbach ⁷	..	WFOE	—	Luckenbach Co.	..	..	..	—	—	..	X	0.20
Lewiston ³	..	WSOU	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Lexington KNB ⁴	..	KNB	50	Colonial Nav. Co.	..	..	..	300, 550, 600	P G	..	N	0.15
Lexington NEDB ⁹	..	NEDB	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11
Libby Maine ⁷	..	KDV	300	Libby McNeil and Libby	..	..	..	300, 450, 535, 600	P G	..	X	0.40 13
Liberator ⁷	..	KRIU	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.40
Liberty WCOO ⁷	..	WCOO	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20
Liberty Land ³	..	KISS	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Lieut. Geo. M. Harris ⁶	..	WYR	30	U.S. Army Signals	..	..	..	400	O	..	X	—
Lighburne ⁵	..	KIVF	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Ligonier ³	..	KTD	200	Gulf Refining Co.	..	..	..	300, 600	P G	..	X	0.20 11
Lilac ⁵	..	NUCF	—	Bureau of Lighthouses	..	..	..	300, 600	P G	..	N	0.20 11
Limit (The) ³	..	WCV	100	Whitney Bros. Co.	..	..	..	300, 600	P G	..	X	0.40 13
Limon ⁹	..	KDR	125	United Fruit Co.	..	..	..	300, 450, 600	P G	..	X	0.10
Liscum ⁶	..	WXE	300	U.S. Army Signals	..	..	..	600	P G	..	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Litchfield *	NUMM	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
Lithopolis *	WQEA	200	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Little *	NKT	—	Navy	300, 600	P G	N	0.40 12 0.20 11	—	
L. J. Drake *	WZAA	300	Standard Oil Co. of N.J.	300, 600	P G	N	0.20 11 0.20 11	—	
Lockport *	KIXM	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.20 11	—	
Logan *	WXF	300	U.S. Army Signals	300, 600	P G	N	0.20 11 0.20 11	—	
Lone Star *	KZUO	150	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Long *	NEPD	—	Navy	300, 600	P G	N	0.20 11 0.20 11	—	
Lonoke *	KPOI	200	U.S. Shipping Board	300, 600	P G	X	0.40 12 0.20 11	—	
Lorain *	KIFZ	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Lordship Manor *	KIXN	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Louisiana KUL *	KUL	300	Texas Company	300, 450, 600	P G	X	0.20 11 0.40 12	—	
Louisiana NJB *	NJB	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
Louis Luckenbach *	KIFM	—	Luckenbach Co.	300, 600	P G	N	0.20 11 0.40 12	—	
Louisville KSL *	KSL	200	Internat. Mercantile Marine Co.	300, 600	P G	N	0.20 11 0.40 12	—	
Louisville NABL *	NABL	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
Louisville Bridge *	KIDP	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 12	—	
L. Roscoe *	NZX	150	Alaskan Engineering Commission	300, 600	O	X	0.20 11 0.40 12	—	
Luce *	NEGD	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
Ludlow *	NENZ	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
Luella *	KLAA	200	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 12	—	
Lurline *	WML	150	Matson Nav. Co.	300, 450, 600	P G	X	0.20 11 0.20 11	—	
Luxpelle *	KIPV	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Lydia WROI *	WROI	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.20 11	—	
Lyman Stewart *	WTL	150	Matson Nav. Co.	300, 600, 1,800	P G	X	0.20 11 0.40 12	—	
Lynchburg *	WFUO	100	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 12	—	
Mt. *	NYV	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	
M. A. Bradley *	WQH	200	Harvey H. Brown & Co.	300, 600	P G	X	0.20 11 0.40 12	—	

Maccona	..	KFC	300	Maccona S.S. Corpn.	..	..	300, 450, 600	P G	..	N	0.20 11 0.40 12
Madawaska NEE	..	NEE	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Maddox	..	NETX	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Madison	..	KOG	300	Old Dominion S.S. Co.	..	..	300, 450, 600	P G	..	N	0.20 11 0.40 12
Madrona	..	NAMV	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Magnolia	..	NAPS	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Magunkook	..	WJUO	300	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Mahan	..	NEQK	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Mahanna	..	KKP	—	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Mahnet	..	KFM	—	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Mahopac NETD	..	NETD	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Maiden Creek	..	KIPX	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Maine KUO	..	KUO	200	U.S. Shipping Board	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Maine KXD	..	KXD	50	New England S.S. Co.	..	..	300, 550, 600	P G	..	N	0.15 11 0.20 11
Maine NJL	..	NJL	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Maitland No. 1	..	WLE	100	Harvey H. Brown & Co.	..	..	300, 600	P G	..	X	0.10 11 0.20 12
Majave	..	KNUE	—	U.S. Shipping Board	..	..	300, 600	P G	..	X	—
Major Albert G. Gorse	..	WYQ	30	Bureau of Lighthouses	..	..	1,200	O	..	X	—
Major Evan Thomas	..	WYO	35	Bureau of Lighthouses	..	..	300	O	..	X	—
Major Guy Howard	..	WZY	100	Bureau of Lighthouses	..	..	400	O	..	X	—
Major Samuel Ringgold	..	WYC	100	Navy	..	..	300	O	..	X	—
Major Wheeler	..	WFII	300	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Makanda	..	KPUA	200	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Malden	..	KZV	200	New England Fuel & Transn. Co.	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Mallard NIKB	..	NIKB	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Manada	..	KNOA	200	U.S. Shipping Board	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Manasses	..	KILX	—	U.S. Shipping Board	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Manchuris	..	WWE	300	International Mercantile Marine Co.	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Mangore	..	KHP	200	Ore S.S. Company	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Mangrove	..	NANS	—	Navy	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Manhattan NEKZ	..	NEKZ	—	U.S. Coastguard Dept.	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Manitou WFW	..	WFW	150	Northern Mich. Transportation Co.	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Manitowoc	..	KRQ	275	American Transatlantic Co.	..	..	300, 450, 525, 600	P G	..	X	0.10 11 0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							France.	France.	
Manley *	NSH	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Manna Hatta *	NADS	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Mannahocking *	KEZX	—	U.S. Shipping Board ..	300, 600	P G ..	X	0.20 11 0.40 11	—	
Manning *	NRN	150	U.S. Coastguard Dept. ..	300, 600	P G ..	N	0.20 11 0.40 11	—	
Manoa *	WMQ	200	Matson Nav. Co.	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Manzanita *	NLU	100	U.S. Bureau of Lighthouses ..	600, 759, 1,000	P G ..	X	—	—	
Maple NAPV *	NAPV	—	U.S. Bureau of Lighthouses ..	300, 600	O ..	X	0.20 11 0.40 11	—	
Maracaibo *	KDM	300	Atlantic & Caribbean S.N. Co. ..	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Maratanza ?	WCEI	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Marcus *	NUMG	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Margaret KZO *	KZO	200	A. H. Bull S.S. Co.	300, 600	P G ..	X	0.20 11 0.40 11	—	
Margaret WRQ *	WRQ	100	Margaret Ship Co.	300, 450, 525, 600	—	—	—	—	
Mariana *	WWZ	250	N.Y. & Porto Rico S.S. Co. ..	300, 450, 600	P G ..	N	0.20 11 0.40 11	—	
Marica ?	KNK	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 11 0.40 11	—	
Marigold *	NAQV	—	Navy	300, 600	O ..	X	0.20 11 0.40 11	—	
Marina KIVD *	KIVD	—	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Mariners Harbour *	KKEU	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Marne REDJ *	KEDJ	300	U.S. Shipping Board	300, 600	P G ..	N	0.20 11 0.40 11	—	
Marquette and Bessemer No. 1 *	WEW	100	U.S. Shipping Board	300, 425, 540, 600	P G ..	X	0.10	—	
Marquette and Bessemer No. 2 *	WEX	125	U.S. Shipping Board	300, 425, 540, 600	P G ..	X	0.10	—	
Mars ? ..	NJR	—	Navy	300, 600	P G ..	N	0.20 11 0.40 11	—	
Marshall *	WZUO	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Marshfield *	KECC	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	
Marsodak ?	KOCM	—	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 11	—	

Masca *	KIBL	—	U.S. Shipping Board	300, 600	PG	N	0.20
Mascotte *	KOW	150	Peninsular & Oriental S.S. Co.	300, 600	PG	N	0.20 11
Mason *	NAGG	—	Navy	300, 600	PG	N	0.40 12
Massachusetts *	NJT	—	Navy	300, 600	PG	N	0.20 11
Masuda *	KMII	300	U.S. Shipping Board	300, 600	PG	X	0.40 12
Matanzas *	WFEU	200	N.Y. & Cuba Mail S.S. Co.	300, 450, 600	PG	X	0.20 11
Matinicoch *	KID	200	Standard Oil Co. of N.J.	300, 450, 600	PG	X	0.40 12
Matoa *	KMJ	200	Warren Transportation Co.	300, 600	PG	X	0.20 11
Matsonia *	WMP	150	Matson Nav. Co.	300, 450, 600	PG	N	0.40 12
Mattapan *	WCEO	200	U.S. Shipping Board	300, 600	PG	X	0.20 11
Mattole *	NUGM	—	Navy	300, 600	PG	N	0.40 12
Mauban *	KRAE	—	Cia de Tabacos del Philippines	—	—	—	0.20 11
Maul *	WMR	300	Matson Nav. Co.	300, 450, 600	PG	N	0.40 12
Maunee *	NNE	—	Navy	300, 600	PG	N	0.20 11
Maury *	NEPG	—	Navy	300, 600	PG	N	0.40 12
May *	NALQ	—	Navy	300, 600	PG	N	0.20 11
Mayflower NJV *	NJV	—	Navy	300, 600	PG	N	0.40 12
Mayflower NZQ *	NZQ	—	Bureau of Lighthouses	300, 600	PG	N	0.20 11
Mayport *	WTIE	—	U.S. Shipping Board	300, 600	PG	X	0.40 12
Mayrant *	NJU	—	Navy	300, 600	PG	N	0.20 11
Mazama *	KNUO	200	U.S. Shipping Board	300, 600	PG	X	0.40 12
McCall *	NJW	—	Navy	300, 600	PG	N	0.20 11
McCalla *	NIGC	—	Navy	300, 600	PG	N	0.40 12
McCawley *	NULS	—	Navy	300, 600	PG	N	0.20 11
McClellan *	KYF	300	U.S. Shipping Board	300, 600	PG	X	0.40 12
McCook *	NIGB	—	Navy	300, 600	PG	N	0.20 11
McCulloch *	NRH	150	U.S. Coastguard Dept.	300, 600	PG	N	0.40 12
McDermut *	NIGG	—	Navy	300, 600	PG	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
McDougal *	NIT	—	—	300, 600	P G	N	Frans.	—	—
McFarland *	NETB	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
McKean *	NEMT	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
McKee *	NACQ	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
McKeesport *	KEXB	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 11	—	—
McLanahan *	NIGK	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Meade *	NEBJ	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Medford *	WRUE	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 11	—	—
Medina *	KEI	300	Mallory S.S. Co.	300, 450, 600	P G	—	0.20 11 0.40 11	—	—
Medusa NEMC *	NEMC	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Melrose *	KZW	300	New England Fuel & Transportation Co.	300, 600	P G	X	0.20 11 0.40 11	—	—
Melville NKA *	NKA	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Mendora *	KIKN	—	U.S. Shipping Board	300, 600	P G	—	0.20 11 0.40 11	—	—
Menominee KODL *	KODL	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 11	—	—
Merced *	KEFF	—	Alaska-Portland Packer's Assn.	300, 600	P G	—	0.20 11 0.40 11	—	—
Mersey Victory *	KIVG	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 11	—	—
Mercy *	NKK	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Merredith *	NETS	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Merridon *	KILP	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 11	—	—
Merrimack *	KQM	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	—	0.20 11 0.40 11	—	—
Merritt *	WXI	—	Navy	300, 600	P G	N	0.20 11 0.40 11	—	—
Metapan *	KLF	500	United Fruit Co.	300, 600	P G	N	0.20 11 0.40 11	—	—
Mexican *	WKL	350	Amer. Hawaiian S.S. Co.	300, 600	P G	N	0.20 11 0.40 11	—	—

Miami *	..	KOZ	150	Peninsular & Occidental S.S. Co.	300, 800	P G	..	N	0.40 11 0.20 12
Michigan NJZ *	..	NJZ	—	Navy	300, 800	P G	..	N	0.40 11 0.20 12
Middlebury *	..	KZAA	—	U.S. Shipping Board	300, 800	P G	..	X	0.40 11 0.20 12
Middlesex *	..	WRO	—	Coastwise Transportation Co.	300, 800	P G	..	X	0.20
Mielero *	..	KNT	300	Cuba Distilling Co.	300, 450, 600	P G	..	X	0.20 11 0.40 12
Miller County *	..	KERX	—	U.S. Shipping Board	300, 800	P G	..	X	0.20 11 0.40 12
Millinocket *	..	KNM	200	A. H. Bull S.S. Co.	300, 800	P G	..	X	0.20 11 0.40 12
Milton WSOA *	..	WSOA	200	U.S. Shipping Board	300, 800	P G	..	X	0.20
Milwaukee *	..	KEXS	—	Grand Trunk Car Ferry Line	300, 800	P G	..	X	0.20
Milwaukee Bridge *	..	KIBF	—	U.S. Shipping Board	300, 800	P G	..	X	0.20
Minela *	..	KSEE	—	U.S. Shipping Board	300, 800	P G	..	N	0.20 11 0.40 12
Minneapolis *	..	NGB	—	Navy	300, 800	P G	..	N	0.40 12
Minnequa *	..	KIVB	—	U.S. Shipping Board	300, 800	P G	..	X	0.20 11 0.40 12
Minnesota NKD *	..	NKD	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Minnesota WEK *	..	WEK	150	U.S. Shipping Board	300, 800	P G	..	N	0.20
Minnesota WMI *	..	WMI	150	Internat. Mercantile Marine Co.	300, 800	P G	..	N	0.20 11 0.40 12
Minnesota *	..	WKM	200	Amer.-Hawaiian S.S. Co.	300, 800	P G	..	X	0.20 11 0.40 12
Mississippi NKE *	..	NKE	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Missouri NKF *	..	NKF	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Missouri WFX *	..	WFX	125	Northern Mich. Transportation Co.	300, 800	P G	..	N	0.10
M. J. Scanlon *	..	WJAO	300	U.S. Shipping Board	300, 450, 600	P G	..	X	0.20
Mobile *	..	NIVB	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Moccasin *	..	WIG	—	U.S. Shipping Board	300, 800	P G	..	N	0.20
Mohave *	..	NTO	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Mohawk KVM *	..	KVM	200	Clyde S.S. Co.	300, 450, 600	P G	..	N	0.40 12
Mohawk KXE *	..	KXE	50	New England S.S. Co.	300, 800	P G	..	N	0.40 12
Mohawk NRM *	..	NRM	—	U.S. Coast Guard Dept.	300, 800	P G	..	N	0.15
Mohawk NUFB *	..	NUFB	—	Navy	300, 800	P G	..	N	0.20 11 0.40 12
Mohegan *	..	KXM	50	New England S.S. Co.	300, 450, 600	P G	..	N	0.40 12
Mojave *	..	WJEA	200	U.S. Shipping Board	300, 800	P G	..	X	0.15
Moldegaard *	..	KNR	200	Bull-Insular S.S. Co.	300, 800	P G	..	X	0.20 11 0.40 12
Moline *	..	KENN	200	U.S. Shipping Board	300, 800	P G	..	X	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.									
Monius ²	KKM	300	U.S. Shipping Board	300, 450, 600	P G	N	—	—	Frances.
Monadnock NHD ²	NHD	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Monaghan ²	NKL	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Monaha ²	KFEO	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Mongolia ²	WWN	250	Atlantic Transport Co.	300, 600	P G	N	0.20 11 0.40 12	—	—
Monmouth WXUO ²	WXUO	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Mono ²	WBOA	150	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Monocacy ²	NQQ	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Montana NKM ²	NKM	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Montauk ²	NARN	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Montcalm NEQF ²	NEQF	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Montclair ²	KVII	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Monterey KWY ²	KWY	200	N.Y. & Cuba Mail S.S. Co.	300, 450, 600	P G	N	0.20 11 0.40 12	—	—
Monterey NKN ²	NKN	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Montezuma ²	KSUU	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Montgomery KIJP ²	KIJP	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Montgomery NAXJ ²	NAXJ	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Monticello ²	WLJ	100	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Montoso ²	WKY	200	N.Y. & Porto Rico S.S. Co.	300, 450, 600	P G	N	0.20 11 0.40 12	—	—
Montpelier ²	WLKZ	300	U.S. Shipping Board	300, 450, 600	P G	N	0.20 11 0.40 12	—	—
Montrolite ²	WEQ	—	Standard Oil Co. of N.J.	300, 600	P G	N	0.20 11 0.40 12	—	—
Moody ²	NULT	—	Navy	300, 600	P G	N	0.20 11 0.40 12	—	—
Moonlite ²	KPL	100	Standard Oil Co. of N.J.	300, 450, 600	P G	N	0.20 11 0.40 12	—	—
Moosabee ²	KIKP	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Moraine ²	KPEU	200	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—
Morganza ²	KEGB	200	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 12	—	—

Moritz ?	KPEO	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Morrill ?	NRC	100	U.S. Coastguard Dept.	300, 600	P G	..	N	0.20 11
Morris ?	NWS	—	Navy	300, 600	P G	..	N	0.40 12
Morristown ?	WGAI	—	U.S. Shipping Board	300, 600	P G	..	N	0.40 12
Morro Castle ?	KWC	300	N.Y. & Cuba Mail S.S. Co.	300, 450, 600	P G	..	N	0.20 11
Moss Point ?	KETJ	200	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Mount Baker ?	KYD	300	Gaston Williams & Wignmore S.S. Corp.	300, 600	P G	..	X	0.20 11
Mount Evans ?	KMT	—	U.S. Shipping Board	300, 600	P G	..	X	0.40 12
Mount Hood ?	WRK	150	Gaston Williams & Wignmore S.S. Corp.	300, 600	P G	..	X	0.20 11
Mount Hope ?	KOL	25	U.S. Shipping Board	300	P	..	X	0.40 12
Mount Rainier ?	WSOE	175	Gaston Williams & Wignmore S.S. Corp.	300, 600	P G	..	X	0.20 11
Mount Shasta ?	WHH	200	U.S. Shipping Board	300, 450, 600	P G	..	X	0.40 12
Mr. Vernon Bridge ?	KWA	300	U.S. Shipping Board	300, 600	P G	..	X	0.20
Mugford ?	NEXR	—	Navy	300, 600	P G	..	N	0.20 11
Mullany ?	NUML	—	Navy	300, 600	P G	..	N	0.10 12
Mulpua ?	KIDJ	—	U.S. Shipping Board	300, 600	P G	..	X	0.20 11
Multnomah ?	WMA	150	Chas. R. McCormick & Co.	300, 600	P G	..	N	0.40 12
Munaires ?	WJN	—	Munson S.S. Lines	300, 600	P G	..	X	0.20 11
Munabro ?	KUX	—	Munson S.S. Lines	300, 450, 600	P G	..	N	0.40 12
Munamar ?	KUI	200	Munson S.S. Lines	300, 600	P G	..	X	0.40 12
Mundale ?	KUJ	200	Munson S.S. Lines	300, 450, 600	P G	..	X	0.20 11
Mundelta ?	KUF	200	Munson S.S. Lines	300, 600	P G	..	X	0.40 12
Mundo (El) ?	KKU	200	Southern Pacific Co.	300, 600	P G	..	X	0.20 11
Munindies ?	KVE	—	Munson S.S. Lines	300, 600	P G	..	X	0.40 12
Munplace ?	KUG	200	Munson S.S. Lines	300, 450, 600	P G	..	X	0.20 11
Munra ?	WDA	—	Munson S.S. Lines	300, 600	P G	..	X	0.40 12
Munrio ?	KVD	—	Munson S.S. Lines	300, 450, 600	P G	..	X	0.20 11
Munsomo ?	KUK	200	Munson S.S. Lines	300, 450, 600	P G	..	X	0.40 12
Munwood ?	KUH	200	Munson S.S. Lines	300, 600	P G	..	X	0.20 11
Murray ?	NAXK	—	Navy	300, 600	P G	..	N	0.40 12
Murvine ?	NUMJ	—	Navy	300, 600	P G	..	N	0.20 11
Muscetine ?	KJH	—	U.S. Shipping Board	300, 600	P G	..	N	0.40 12
Musketo ?	WDAE	—	U.S. Shipping Board	300, 600	P G	..	N	0.20
Muskoges ?	KIB	300	Standard Oil Co. of N.J.	300, 450, 600	P G	..	X	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	[Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Mystery ⁶	KYZ	—	Lucy Work Hewitt	300, 600	P G	—	—	—	
Mystic ³	KHZ	300	U.S. Shipping Board	300, 600	P G	X	0.20 11	0.20 11	
N ¹	NZE	—	Navy	300, 600	P G	N	0.40 12	0.40 12	
N ²	NZF	—	Navy	300, 600	P G	N	0.20 11	0.20 11	
N ³	NZG	—	Navy	300, 600	P G	N	0.10 12	0.10 12	
N ⁴	NZH	—	Navy	300, 600	P G	N	0.20 11	0.20 11	
N ⁵	NZI	—	Navy	300, 600	P G	N	0.40 12	0.40 12	
N ⁶	NZJ	—	Navy	300, 600	P G	N	0.20 11	0.20 11	
N ⁷	NZK	—	Navy	300, 600	P G	N	0.40 12	0.40 12	
Nacogdoches ⁶	KKIU	—	U.S. Shipping Board	300, 600	P G	—	0.20	0.20	
Nacooches ⁵	KFP	300	Ocean S.S. Co. of Savannah	300, 450, 600	P G	N	0.20 11	0.20 11	
Nahant ⁹	NQE	—	Navy	300, 600	P G	N	0.40 12	0.40 12	
Nahaska ⁹	KNEO	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	0.20 11	
Nahant ⁹	NUKM	—	Navy	300, 600	P G	N	0.40 12	0.40 12	
Naiwa ³	WCUI	—	U.S. Shipping Board	300, 600	P G	X	0.20	0.20	
Nameaug ⁷	KITN	—	U.S. Shipping Board	300, 600	P G	N	0.20	0.20	
Namecki ³	WFAA	—	U.S. Shipping Board	300, 600	P G	N	0.20	0.20	
Nanking ⁵	KKEE	300	China Mail S.S. Co.	300, 450, 600	P G	N	0.40 12	0.40 12	
Nansmond ³	WQR	300	U.S. Shipping Board	300, 450, 600	P G	N	0.20	0.20	
Nanshan ⁹	NQK	—	Navy	300, 600	P G	N	0.20 11	0.20 11	
Nantahala ³	WGIE	300	U.S. Shipping Board	300, 600	P G	N	0.40 12	0.40 12	
Nantasket ³	WLIO	—	U.S. Shipping Board	300, 600	P G	N	0.20	0.20	
Nantucket ⁵	KQN	150	Merchants & Miners Trans. Co.	300, 450, 600	P G	N	0.20 11	0.20 11	
Napa ⁹	NEVC	—	Navy	300, 600	P G	N	0.40 12	0.40 12	

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Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Newton KZX ⁵	KZX	300	New England Fuel & Transportation Co.	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
New Windsor ⁵	KGAE	—	U.S. Shipping Board	300, 600	P G ..	N	0.20	—	
New York KSN ⁵	KSN	200	Internat. Mer. Marine Co.	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
New York KUW ⁵	KUW	300	Texas Company	300, 450, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
New York NCC ⁵	NCC	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Niagara NABC ⁵	NABC	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nicholson ⁵	NIU	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nipsic ⁷	KCOE	—	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Nishmaha ⁵	KEVM	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nitro ⁵	NELL	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Noa ⁹	NUKF	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nobles ⁴	KODB	—	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Nokatav ⁵	KOCF	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nokomis ⁵	NANM	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Noma ^{6 10}	KYO	—	Vincent Astor	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Nonantum ⁷	KIXP	—	U.S. Shipping Board	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Nopatin ⁵	NAMQ	—	Navy	300, 600	P G ..	N	0.20 ¹¹ 0.40 ¹²	—	
Norfolk ⁴	WZUA	—	Coastwise Transportation Co.	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Norlina ⁵	KJE	150	Garland S.S. Corpn.	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Norma ⁷	KEKC	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Norma Bridge ⁶	WIG	200	Pan-American Petroleum & Transport Co.	300, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	
Norte (EI) ⁵	KKN	200	Southern Pacific Co.	300, 450, 600	P G ..	X	0.20 ¹¹ 0.40 ¹²	—	

WIRE	SHIP	CLASS	NO.	NAME	TYPE	TONS	STATUS	DATE	REMARKS
North Land KJD	150	ARMY Transport	300, 450, 800	..	..	..	..	..	..
Northland WCN	200	Eastern S.S. Lines	300, 600	..	..	..	..	..	..
Northland WCN	150	Northern S.S. Co.	300, 600	..	..	..	..	..	..
Northland WCN	100	Albers Bros. Milling Co.	300, 450, 800	..	..	..	..	..	..
North Pines	—	U.S. Shipping Board	300, 600	..	..	..	..	..	..
North Pole	300	U.S. Shipping Board	300, 600	..	..	..	..	..	..
North Star	300	Eastern S.S. Lines	300, 600	..	..	..	..	..	..
Northwestern KUO	200	Texas Company	300, 450, 800	..	..	..	..	..	..
Northwestern WAN	100	Alaska S.S. Co.	300, 600	..	..	..	..	..	..
North Wind	75	Chas. Martin Clark	300	..	..	..	..	..	..
Norwood	250	Pacific Amer. Fisheries	300, 450, 525, 800	..	..	..	..	..	..
Noshico	—	U.S. Shipping Board	300, 600	..	..	..	..	..	..
Nuecos	200	Mallory S.S. Co.	300, 600	..	..	..	..	..	..
Nupolela	200	U.S. Shipping Board	300, 600	..	..	..	..	..	..
Nushagak	300	Alaska-Portland Packer's Assn.	300, 400, 500, 800	..	..	..	..	..	..
Nuuanu	200	Gen. Petroleum Corporation	300, 600	..	..	..	..	..	..
Nyanza WJO	100	U.S. Shipping Board	300, 600	..	..	..	..	..	..
O.1	—	Navy	300, 600	..	..	..	..	..	..
O.2	—	Navy	300, 600	..	..	..	..	..	..
O.3	—	Navy	300, 600	..	..	..	..	..	..
O.4	—	Navy	300, 600	..	..	..	..	..	..
O.5	—	Navy	300, 600	..	..	..	..	..	..
O.6	—	Navy	300, 600	..	..	..	..	..	..
O.7	—	Navy	300, 600	..	..	..	..	..	..
O.8	—	Navy	300, 600	..	..	..	..	..	..
O.9	—	Navy	300, 600	..	..	..	..	..	..
O.10	—	Navy	300, 600	..	..	..	..	..	..
O.11	—	Navy	300, 600	..	..	..	..	..	..
O.12	—	Navy	300, 600	..	..	..	..	..	..

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
O.13 *	NEZN	—	Navy	300, 800	P G ..	N	Francs.	0.20 11	—
O.14 *	NEVD	—	Navy	300, 800	P G ..	N	—	0.40 12	—
O.15 *	NAXS	—	Navy	300, 800	P G ..	N	—	0.20 11	—
O.16 *	NASM	—	Navy	300, 800	P G ..	N	—	0.20 11	—
O. A. Hermanson *	WRA	—	Southern Oil & Transport Corp.	—	—	—	—	0.40 12	—
Oakland *	KMOO	275	U.S. Shipping Board	300, 800	P G ..	N	—	0.20 11	—
Oakley C. Curtis *	KQL	—	France & Canada S.S. Corporation	300, 450, 800	P G ..	X	—	0.40 12	—
Oakwood *	KXOO	200	Alabama S.S. Co.	300, 440, 525, 800	P G ..	X	—	0.20 11	—
Oback ?	KELV	200	U.S. Shipping Board	300, 800	P G ..	X	—	0.40 12	—
O'Bannon *	NEXS	—	Navy	300, 800	P G ..	N	—	0.20 11	—
O'Brien NIV *	NIV	—	Navy	300, 800	P G ..	N	—	0.40 12	—
Occidente (El) *	KKX	200	Southern Pacific Co.	300, 800	P G ..	N	—	0.20 11	—
Ocland *	WGEO	—	U.S. Shipping Board	300, 800	P G ..	—	—	0.40 12	—
Ocones *	KJC	200	U.S. Shipping Board	300, 800	P G ..	X	—	0.20 11	—
Octorara KRIO *	KRIO	200	U.S. Shipping Board	300, 800	P G ..	X	—	0.40 12	—
Octorara WCD *	WCD	100	Great Lakes Transit Corp.	300, 800	P G ..	N	—	0.20	—
Oceola *	NOA	—	Navy	300, 800	P G ..	N	—	0.10	—
Oglathorpe ?	WZUU	—	U.S. Shipping Board	300, 800	P G ..	—	—	0.20 11	—
Ogonitz *	KINB	300	U.S. Shipping Board	300, 800	P G ..	X	—	0.40 12	—
Ohio *	NMW	—	Navy	300, 800	P G ..	N	—	0.20 11	—
Ohioan *	WKQ	200	Amer.-Hawaiian Corporation	300, 800	P G ..	X	—	0.40 12	—
Okesa ? ..	WXEE	200	U.S. Shipping Board	300, 800	P G ..	X	—	0.20	—
Okiya *	WRUI	—	U.S. Shipping Board	300, 800	P G ..	—	—	0.20	—
Oklahoma *	NCB	—	Navy	300, 800	P G ..	N	—	0.20 11	—
								0.40 12	—

[illegible]

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Ossipee ⁶ ..	NRJ	175	U.S. Coastguard Dept.	300, 600, 750, 1,000	P G ..	N	0.20	—	
Osego ⁵ ..	WDG	200	U.S. Shipping Board	300, 450, 600	P G ..	N	0.20	—	
Otto M. Reiss ⁵ ..	WNG	200	Reiss S.S. Company	300, 450, 600	P G ..	X	0.10	—	
O. T. Waring ⁵ ..	KJW	300	Standard Oil Co. of N.J. ..	300, 450, 600	P G ..	X	0.20 11	—	
Overbrook ⁵ ..	KLAE	—	U.S. Shipping Board	300, 600	P G ..	N	0.40 12	—	
Overton ⁵ ..	NUJN	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Owatama ⁶ ..	WMOO	—	U.S. Shipping Board	300, 600	P G ..	X	0.40 12	—	
Owego ⁵ ..	KFQ	300	Federal S.S. Corpn.	300, 450, 600	P G ..	X	0.20 11	—	
Owl ⁶ ..	NACS	—	Navy ..	300, 600	P G ..	N	0.40 12	—	
Oyaka ⁵ ..	KELX	200	U.S. Shipping Board	300, 600	P G ..	X	0.20	—	
Ozama ⁶ ..	WRX	—	Atlantic Gulf & W. Indies S.S. Lines	300, 600	—	—	—	—	
Ozaukee ⁷ ..	WXAA	—	U.S. Shipping Board	300, 600	P G ..	N	0.20	—	
Ozette ⁵ ..	KEVP	300	U.S. Shipping Board	300, 600	P G ..	N	0.20 11	—	
Padurah ⁵ ..	NOG	—	Navy ..	300, 600	P G ..	N	0.40 12	—	
P. A. H. Hubbard ⁶ ..	NDX	—	Navy ..	300, 600	P G ..	N	0.20	—	
Patta ⁵ ..	KEQZ	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 11	—	
Palmer ⁵ ..	NECV	—	Navy ..	300, 600	P G ..	N	0.40 12	—	
Palos ⁵ ..	NQS	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Pamawav ⁶ ..	WPEU	—	U.S. Shipping Board	300, 600	P G ..	N	0.40 12	—	
Pamlico ⁶ ..	NRR	—	U.S. Coastguard Dept.	300, 600	P G ..	N	0.20 11	—	
Pampanga ⁵ ..	NQT	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Panama KMH ⁶ ..	KMH	—	Panama R. Co. ..	300, 450, 600	P G ..	N	0.40 12	—	
Panaman ⁵ ..	WKR	200	Amer.-Hawaiian S.S. Co.	300, 600	P G ..	X	0.20 11	—	
Pan-American ⁶ ..	KUT	150	Texas S.S. Co. ..	300, 600	P G ..	X	0.40 12	—	
Panay ⁶ ..	KEMJ	300	Madrigal & Co. ..	300, 450, 525, 600	P G ..	N	0.20 11	—	

Panga, ⁷	WJEU	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Patola, ⁸	WMUO	300	U.S. Shipping Board	300, 600	P G	..	X	0.20
Patther, ⁹	NOJ	—	Navy	300, 600	P G	..	N	0.20 11
Panuco KMM, ⁵	KMM	200	Freeport & Tampico Fuel Oil	300, 600	P G	..	X	0.40 12
Panuco KWM, ⁵	KWM	250	Trans. Corp. Gulf & W. Indies S.S. Lines	300, 450, 600	P G	..	X	0.20 11
Paraguay KTT, ⁵	KTT	150	Sun Company	300, 600	P G	..	X	0.20 11
Parissima, ⁸	KDG	500	United Fruit Co.	300, 600	P G	..	N	0.40 12
Parker, ⁹	NIX	—	Navy	300, 600	P G	..	N	0.20 11
Parkville, ⁵	KIZG	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Parthian, ⁵	WCE	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Partridge, ⁵	NIJG	—	Navy	300, 600	P G	..	N	0.20 11
Pasadena, ⁵	KMEU	300	U.S. Shipping Board	300, 450, 600	P G	..	N	0.40 12
Pascagoula, ⁵	WBHU	200	U.S. Shipping Board	300, 600	P G	..	X	0.20
Passaic Bridge, ⁷	KIBJ	300	U.S. Shipping Board	300, 600	P G	..	X	0.20
Pastores, ⁵	KLA	500	United Fruit Co.	300, 600	P G	..	N	0.40
Patapasco, ⁵	NOL	—	Navy	300, 600	P G	..	N	0.20 11
Pathfinder KGY, ⁵	KGY	300	N.Y. & Porto Rico S.S. Company	300, 450, 600	P G	..	X	0.40 12
Pathfinder NLJ, ⁵	NLJ	150	Dept. of Commerce	300, 600	O	..	N	—
Patoka, ⁵	NUGN	—	Navy	300, 600	P G	..	N	0.20 11
Patricia NIVC, ⁵	NIVC	—	Navy	300, 600	P G	..	N	0.40 12
Patrol KIN, ⁵	KIN	—	Police Dept.	300, 400, 600	P	..	N	—
Patterson NLH, ⁵	NLH	150	Navy	300, 600	O	..	N	0.20 11
Patterson NOK, ⁵	NOK	—	Navy	300, 600	P G	..	X	0.40 12
Patuxent, ⁵	NOM	—	Navy	300, 600	P G	..	N	0.20 11
Paulding, ⁵	NON	—	Navy	300, 600	P G	..	N	0.10 12
Paul Hamilton, ⁵	NAQN	—	Navy	300, 600	P G	..	N	0.20 11
Paul H. Harwood, ⁵	KJIO	—	Pan.Amer. Petroleum & Trans. Co.	300, 600	—	..	—	0.40 12
Paul Jones, ⁵	NOP	—	Navy	300, 600	P G	..	N	0.20 11
Paulsboro, ⁵	KRS	300	Vacuum Oil Co.	300, 450, 600	P G	..	X	0.20 11
Pawnee WLU, ⁵	WLU	250	U.S. Shipping Board	300, 450, 600	P G	..	N	0.40 12
Pawtucket, ⁵	KINZ	—	U.S. Shipping Board	300, 600	P G	..	X	0.20
Peacock, ⁵	NIKD	—	Navy	300, 600	P G	..	X	0.20 11
Pearl Shell, ⁵	WIC	250	Pearl Shell S.S. Co.	300, 450, 600	P G	..	X	0.40 12
Pecos, ⁵	NIFQ	—	Navy	300, 600	P G	..	N	0.20 11
Peerless KIR, ⁵	KIR	300	Standard Transportation Co.	300, 450, 600	P G	..	X	0.40 12
Peerless NECP, ⁵	NECP	—	Navy	300, 600	P G	..	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Pelican	KIRL	—	Pelican Company	—	P G	—	—	—	—
Penguin	NECT	—	..	300, 600	..	N	0.20 ¹¹	0.40 ¹²	—
Pennant	KME	200	Pierce Oil Corporation	300, 450, 600	P G	X	0.20 ¹¹	0.40 ¹²	—
Pennsylvania KUP	KUP	300	Texas S.S. Co.	300, 450, 600	P G	X	0.20 ¹¹	0.40 ¹²	—
Pennsylvania NCE	NCE	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Pennsylvania	WKP	200	Amer. Hawaiian S.S. Co.	300, 600	P G	X	0.20 ¹¹	0.40 ¹²	—
Penobscot	NOE	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Pensacola NGN	NGN	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Peoria	NOW	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Pequonnock	KXP	50	New England S.S. Co.	300, 550, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Pequot	WLX	200	U.S. Shipping Board	300, 600	P G	N	0.15	0.20	—
Percival	NIFJ	..	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Pere Marquette	WDA	100	Pere Marquette Rld. Co.	300, 550, 600	P R	X	0.10	0.10	—
Pere Marquette 8	KINL	150	Pere Marquette Rld. Co.	300, 600	P R	X	0.10	0.10	—
Pere Marquette 17	WDC	100	Pere Marquette Rld. Co.	300, 500, 600	P R	X	0.10	0.10	—
Pere Marquette 18	WDD	100	Pere Marquette Rld. Co.	300, 450, 600	P R	X	0.10	0.10	—
Pere Marquette 19	WDE	100	Pere Marquette Rld. Co.	300, 500, 600	P R	X	0.10	0.10	—
Pere Marquette 20	WDE	100	Pere Marquette Rld. Co.	300, 500, 600	P R	X	0.10	0.10	—
Perfection	KTN	200	Standard Transportation Co.	300, 450, 600	P G	X	0.20 ¹¹	0.40 ¹²	—
Perkins	NOX	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Perry	NOY	—	Navy	300, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Persian	KQX	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 ¹¹	0.40 ¹²	—
Peru WWJ	WWJ	150	Pacific Mail S.S. Co.	300, 600	P G	X	0.20 ¹¹	0.40 ¹²	—
Peter H. Crowell	KEXT	200	Crowell & Thurlow S.S. Co.	300, 475, 600	P G	X	0.20 ¹¹	0.40 ¹²	—

Peter Reiss *	WNH	100	Puget Sound Tug Boat Co.	300, 600	P G	X	0.10
Petosekey *	WDH	100	Chicago & S. Haven S.S. Co.	300, 600	P G	X	0.10
Peruta *	KFIE	—	U.S. Shipping Board	300, 600	P G	—	0.20
Philadelphia KDA *	KDA	300	Atlantic & Caribbean S.N. Co.	300, 450, 600	P G	N	0.20 11
Philadelphia KSM *	KSM	200	Internat. Mercantile Marine Co.	300, 600	P G	N	0.40 12
Philip *	NEDG	—	Navy	300, 600	P G	—	0.20 11
Philippines *	WAV	—	U.S. Shipping Board	300, 600	P G	—	0.40 12
Phoenix WJEO *	WJEO	300	U.S. Shipping Board	300, 600	P G	—	0.20
Phoenix Bridge *	WFOU	300	U.S. Shipping Board	300, 600	P G	X	0.20
Phyllis *	KEA	—	W. R. Chamberlain & Co.	300, 600	P G	X	0.20
Plave WGOA *	WGOA	—	U.S. Shipping Board	300, 600	P G	—	—
Pigeon NIKF *	NIKF	—	Navy	300, 600	P G	N	0.20 11
Pinola *	NEVL	—	Navy	300, 600	P G	N	0.40 12
Pioneer KIG *	KIG	200	Standard Oil Co. of N.J.	300, 450, 600	P G	N	0.20 11
Pioneer WPN *	WPN	100	Puget Sound Tug Boat Co.	300, 600	P G	X	0.40 12
Pipestone County *	KIMZ	—	U.S. Shipping Board	300, 600	P G	X	0.20
Piqua *	KMEE	150	U.S. Shipping Board	300, 450, 600	P G	X	0.20 11
Piscataqua *	NAQC	—	Navy	300, 600	P G	N	0.40 12
Pisco *	KFOV	—	Navy	300, 600	P G	—	0.20 11
Pittsburgh *	NOT	—	Navy	300, 600	P G	N	0.40 12
Plainfield *	WIFL	200	U.S. Shipping Board	300, 600	P G	X	0.20 11
Plattsburg *	NANI	—	Navy	300, 600	P G	N	0.40 12
Pleiades *	WNP	200	Luckenbach Co.	400, 600	P G	X	0.20 11
Plymouth KND *	KND	300	Nafra Company	300, 450, 600	P G	N	0.40 12
Plymouth KXH *	KXH	50	Nw England S.S. Co.	300, 550, 600	P G	N	0.40 12
Pocahontas *	NOU	—	Navy	300, 600	P G	N	0.15
Point Adams *	WES	200	U.S. Shipping Board	300, 600	P G	X	0.20 11
Point Arcua *	WHP	250	U.S. Shipping Board	300, 476, 600	P G	X	0.40 12
Point Bonita *	WMT	200	U.S. Shipping Board	300, 600	P G	X	0.20
Point Judith *	KPAA	200	U.S. Shipping Board	300, 600	P G	X	0.20
Point Lobos *	KJUI	200	U.S. Shipping Board	300, 600	P G	X	0.20
Point Loma *	WAU	200	U.S. Shipping Board	300, 600	P G	X	0.20
Polar Bear *	WGOE	300	U.S. Shipping Board	300, 600	P G	X	0.20
Polarine *	WGOE	300	Standard Oil Co. of N.J.	300, 450, 600	P G	N	0.20 11
Polar Land *	WMIE	300	U.S. Shipping Board	300, 600	P G	N	0.40 12
Polar Sea *	KSOA	300	U.S. Shipping Board	300, 600	P G	N	0.20
Polar Star *	KELC	300	U.S. Shipping Board	300, 600	P G	N	0.20
Pollas *	KODM	—	U.S. Shipping Board	300, 600	P G	N	0.20
Polybius *	KIGL	300	U.S. Shipping Board	300, 600	P G	N	0.20
Pompey *	NQF	—	Navy	300, 600	P G	N	0.20 11
Ponce *	KGP	300	N.Y. & Porto Rico S.S. Co.	300, 450, 600	P G	X	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
R.17 *	NAFX	—	Navy	300, 600	PG ..	N	Francs.	Francs.	
R.18 *	NEGC	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.19 *	NEGK	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.20 *	NARZ	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.21 *	NILV	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.22 *	NILX	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.23 *	NILZ	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.24 *	NIMB	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.25 *	NIMC	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.26 *	NIMD	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
R.27 *	NIMF	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
Radford *	NEXB	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
Radiant *	KTR	200	Standard Transportation Co.	300, 450, 600	PG ..	X	0.20 11 0.40 13	—	
Radnor *	KJUE	300	U.S. Shipping Board	300, 600	PG ..	N	0.20 11 0.40 13	—	
Rail *	NAQJ	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
Rainbow NFZ *	NFZ	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
Rainier ?	WRZ	—	Albers Bros., Milling Co.	300, 450, 600	PG ..	X	0.20 11 0.40 13	—	
Rajah WAO *	WAO	—	U.S. Shipping Board	300, 600	PG ..	X	0.20 11 0.40 13	—	
Raleigh *	NIE	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	
Rama *	KRX	350	Rama Navigation Co.	300, 450, 600	PG ..	X	0.20 11 0.40 13	—	
Ramapo *	NUGP	—	Navy	300, 600	PG ..	N	0.20 11 0.40 13	—	

Rambler *	NANP	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20 11 0.40 13
Ramsay NIFC *	NIFC	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Randolph S. Warner *	WZEO	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Ranson B. Fuller *	KRF	200	Eastern S.S. Lines	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Rapidan NUGQ *	NUGQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Rappahannock *	WQO	300	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20
Rathburne *	NACR	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Raven NIKZ *	NIKZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Rayo *	KTL	250	Standard Transportation Co.	..	..	..	300, 600	P G	..	X	0.20
Rebecca Palmer *	WBEI	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Red Cloud *	WJEE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Redlands *	WDUE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Redondo KYT *	KYT	150	U.S. Shipping Board	..	..	..	300, 476, 600	P G	..	N	0.20
Redondo WBM *	WBM	100	Alaska S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Redwing *	NIKG	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Redwood *	WSD	250	Pacific-Amer. Fisheries	..	..	..	300, 450, 525, 600	P G	..	N	0.20 11 0.40 13
Reid *	NTU	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Relay *	KVZ	200	Mexican Telegraph Co.	..	..	..	300, 600	P	..	X	0.20 11 0.40 13
Relief *	KRJ	200	Merritt & Chapman Derrick & Wrecking Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 13
Remlik *	KZR	200	Willis S. Kilmer	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Remus *	KEBX	200	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Reno NAMD *	NAMD	—	Navy	..	..	..	300, 600	P G	..	N	0.20
Reno WYN *	WYN	30	Government	..	..	..	400	O	..	X	0.20
Renshaw *	NEVZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Republic *	WSU	250	Chili S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Rescue *	KRP	350	Merritt & Chapman Derrick & Wrecking Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 13
Resolute *	KRM	200	Merritt & Chapman Derrick & Wrecking Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Restorer *	WIU	300	Commercial Pacific Cable Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 13
Reuce *	WSR	100	Columbia River Packers' Assn.	..	..	..	300, 525, 600	P G	..	X	0.20 11 0.40 13
Rhode Island NTX *	NIX	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Richard J. Reiss *	WNK	200	Reiss S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 13
Richard Peck *	KXR	50	New England S.S. Co.	..	..	..	300, 450, 500, 550, 600	P G	..	X	0.20 11 0.40 13
Richmond *	WTR	200	Standard Oil Co. of California	..	..	..	300, 600	P G	..	N	0.20
Richmond Boro *	KITX	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13
Ringgold *	NALT	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 13

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Rio (El) *	KKZ	200	Southern Pacific Co.	300, 450, 600	P G ..	N	Francs.	—	
Rio Grande *	KEG	200	Mallory S.S. Co.	300, 600	P G ..	X	0.20 11 0.40 12	—	
Rizal *	NEVV	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
R. L. Barnes *	WKUE	—	Robert Barnes S.S. Co.	—	—	—	—	—	
Roanoke *	NHU	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Robert M. Thompson *	KNW	—	J. W. Elwell & Co.	—	—	—	—	—	
Robert P. Clark *	KTH	150	Gulf Refining Co.	300, 450, 600	P G ..	X	0.20 11 0.40 12	—	
Robert Smith *	NUKB	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Robin *	NANQ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Robinson *	NAJX	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rochester *	NTR	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rockaway Park *	KIZZ	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rock Island *	KIND	—	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 12	—	
Rockport *	NBH	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rodgers *	NWT	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Roe *	NTZ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Roman *	WRII	200	U.S. Shipping Board	300, 600	P G ..	X	0.20 11 0.40 12	—	
Romulus *	KIDR	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 11 0.40 12	—	
Roosevelt *	NLR	300	Navy	300, 600	P G ..	X	0.20 11 0.40 12	—	
Roper *	NERX	—	Navy	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rose City *	WWR	200	S.F. & P.S.S. Co.	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rose Mahoney *	KSAE	—	U.S. Shipping Board	300, 600	P G ..	N	0.20 11 0.40 12	—	
Rosewood *	WSH	200	—	300, 450, 525, 600	P G ..	X	0.20 11 0.40 12	—	

Rowan *	..	NKR	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
Royal Arrow *	..	KSW	300	Standard Transit Co.	..	..	..	300, 450, 600	PG	..	N	0.40 12
Roy H. Beattie *	..	WPOA	200	U.S. Shipping Board	..	..	..	300, 600	PG	..	X	0.20 11
Roy Hooper *	..	WCO	—	Sinclair Nav. Co.	..	..	..	—	—	..	—	0.40 12
Ruby *	..	KOBC	—	Amer. Transportation Co.	..	..	..	300, 600	—	..	—	0.20
Rush *	..	WNR	250	Bering Sea Packing Co.	..	..	..	300, 440, 525, 600	PG	..	X	0.20 11
Ruth *	..	KZQ	200	A. H. Bull S.S. Co.	..	..	..	300, 600	PG	..	X	0.20 11
Ruth E. Merrill *	..	KQU	200	Olympia Shipping Corp.	..	..	..	300, 600	PG	..	X	0.40 12
S.1 *	..	NIMG	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.2 *	..	NIMJ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.3 *	..	NIMK	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.4 *	..	NIML	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.5 *	..	NIMM	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.6 *	..	NIMN	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.7 *	..	NIMP	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.8 *	..	NIMQ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.9 *	..	NIMR	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.10 *	..	NIMS	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.11 *	..	NIMT	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.12 *	..	NIMV	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.13 *	..	NIMX	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.14 *	..	NIMZ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.15 *	..	NINB	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.16 *	..	NINC	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.17 *	..	NIND	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.18 *	..	NINF	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.19 *	..	NING	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11
S.20 *	..	NINJ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12
S.21 *	..	NINK	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
S.22 *	NINL	—	Navy	300, 600	P G ..	N	Francs.	Francs.	
S.23 *	NINM	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.24 *	NINN	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.25 *	NINP	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.26 *	NINQ	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.27 *	NINR	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.28 *	NINS	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.29 *	NINT	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.30 *	NINV	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.31 *	NINX	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.32 *	NINZ	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.33 *	NIPB	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.34 *	NIPC	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.35 *	NIPD	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.36 *	NIPF	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.37 *	NIPG	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.38 *	NIPJ	—	Navy	300, 600	P G ..	N	0.40 12	—	
S.39 *	NIPK	—	Navy	300, 600	P G ..	N	0.20 11	—	
S.40 *	NIPL	—	Navy	300, 600	P G ..	N	0.40 12	—	

S.41 *	..	NIPM	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.42 *	..	NIPN	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.43 *	..	NIPP	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.44 *	..	NIPQ	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.45 *	..	NIPR	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.46 *	..	NIPS	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.47 *	..	NIPT	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.48 *	..	NIPV	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.49 *	..	NIPX	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.50 *	..	NIPZ	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
S.51 *	..	NIQK	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sabine KEB ³	..	KEB	300	Mallory S.S. Co.	..	..	300, 450, 600	PG	..	N	0.20 11 0.40 12
Sabine Sun ⁶	..	WLQ	—	Sun Company	..	..	—	—	..	N	—
Sabotawan ⁷	..	KIJJ	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sacandaga ⁵	..	KESC	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sacardaga ⁵	..	WGOT	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sac City ³	..	KEFB	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sachem WQU ⁷	..	WQU	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Saco ⁷	..	KEPT	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sacramento KWV ⁵	..	KWV	200	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sacramento NGV ⁵	..	NGV	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sagadahoc ³	..	KTUO	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sagamore ⁵	..	WBIE	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sagaportack ³	..	KZIU	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sag Harbor ⁷	..	WPAE	200	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Sagua KVO ⁵	..	KVO	300	Atlantic Fruit Co.	..	..	300, 450, 600	PG	..	N	0.20 11 0.40 12
Saguache ⁵	..	KEKL	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Salade ⁵	..	KEFR	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Salavery ⁵	..	KEQX	—	U.S. Shipping Board	..	..	—	—	..	N	—
Salen ⁵	..	NIP	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Salen County ⁵	..	KODR	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Salinas ⁵	..	NUGR	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Salmon ⁵	..	KPOU	200	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Saluda ³	..	KEQG	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Salvation Lass ⁷	..	KIMN	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Samar ⁹	..	NLX	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sarnoa ⁹	..	NABR	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Sampson *	NKS	—	Navy	300, 600	P G	N	Francs. 0.20 11	Francs. —	
Samual Faunce *	KQV	200	France & Canada S.S. Corpn.	300, 450, 600	P G	X	0.40 12	—	
Samuel Mitchell *	WEJ	200	Huron Transportation Co.	300, 450, 600	P G	X	0.20 11	—	
Sanaelisa *	KIGR	—	U.S. Shipping Board	300, 450, 600	P G	X	0.40 12	—	
Sanderling *	NIJS	—	Navy	300, 600	P G	N	0.10	—	
Sandpiper *	NIKK	—	Navy	300, 600	P G	N	0.20 11	—	
Sands *	NULQ	—	Navy	300, 600	P G	N	0.40 12	—	
Sangamon *	WJAA	300	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Santa * ¹⁰	KZS	100	Osborn Howes	300, 600	P G	X	0.40 12	—	
Santiago *	KWE	300	N.Y. & Cuba Mail S.S. Co.	300, 600	P G	X	0.20	—	
Santino *	KRY	200	Gaston Williams & Wigmore S.S. Corporation	300, 450, 600	P G	N	—	—	
Santore *	KDQ	200	Ore S.S. Co.	300, 600	P G	X	0.20 11	—	
Santurce *	KEMV	150	N.Y. & Porto Rico S.S. Co.	300, 450, 600	P G	X	0.40 12	—	
Sapelo *	NUCS	—	Navy	300, 600	P G	X	0.20 11	—	
Sapinero *	KESG	—	U.S. Shipping Board	300, 600	P G	N	0.40 12	—	
Sarah Weems *	WQI	—	Baltimore & Carolina S.S. Co.	300, 600	P G	X	0.20 11	—	
Sarmaca *	KJH	350	United Fruit Co.	300, 600	P G	X	0.40 12	—	
Sara Thompson *	NEMD	—	Navy	300, 600	P G	N	0.20	—	
Saratoga *	NTR	—	Navy	300, 600	P G	N	—	—	
Sarcoite *	WLAA	300	U.S. Shipping Board	300, 600	P G	N	0.40 12	—	
Satis *	WGIO	150	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
Satardia *	KIDC	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Satsuma KJI *	KJH	200	Baer & Co.	300, 600	P G	N	0.40 12	—	
Satsuma *	NAGC	—	Navy	300, 600	P G	N	0.20 11	—	
Sauron *	NWAK	300	Navy	300, 600	P G	N	0.40 12	—	
Sauron *	WBK	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Saugerties *	WAB	300	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	

S. B. Hunt *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Seantic *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Schenck *	—	Navy	..	..	300, 600	PG	..	N	0.20 11
Schenectady *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.40 12
Schley *	—	Navy	..	..	300, 600	PG	..	N	0.20 11
Schodack *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 12
Schoharie *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.40 12
Schoodic *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Schroon *	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Sciota *	—	Navy	..	..	300, 600	PG	..	X	0.20 11
Scorpion *	—	Navy	..	..	300, 600	PG	..	N	0.40 12
Sea Bird *	—	Sea Bird Co.	..	..	—	—	..	—	0.20 11
Seafarer *	—	Seafarer Nav. & Salvage Co.	..	..	—	—	..	—	0.40 12
Seagull *	—	Navy	..	..	300, 600	PG	..	N	0.20 11
Sea Rover *	—	Navy	..	..	300, 600	PG	..	N	0.40 12
Seattle NPG *	—	Navy	..	..	300, 600	PG	..	N	0.20 11
Seattle Spirit *	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.40 12
Sebago *	—	Navy	..	..	300, 600	PG	..	N	0.20
Security *	200	Standard Transportation Co.	..	..	300, 600	PG	..	N	0.20 11
Seendbee *	150	Cleveland & Buffalo Transit Co.	..	..	300, 600	PG	..	X	0.40 12
Seekonk *	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11
Segundo (El) *	150	Standard Oil Co. of California	..	..	300, 600	PG	..	X	0.10
Segurancas *	200	Federal S.S. Corp.	..	..	300, 600	PG	..	X	0.20 11
Selfridge *	—	Navy	..	..	300, 600	PG	..	X	0.40 12
Seminole NRS *	200	U.S. Coastguard Dept.	..	..	300, 600, 952	PG	..	N	0.20 11
Semmes *	—	Navy	..	..	300, 600	PG	..	N	0.40 12
Senator WGS *	100	Pacific S.S. Co.	..	..	300, 600	PG	..	N	0.20 11
Senator Bailey *	200	Gulf Refining Co.	..	..	300, 450, 600	PG	..	N	0.40 12
Seneca *	200	U.S. Coastguard Dept.	..	..	300, 600, 750, 956	PG	..	X	0.20 11
Sepulga *	—	Navy	..	..	300, 600	PG	..	N	0.40 12
								N	0.20
								N	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sequoia *	NLV	100	Bureau of Lighthouses	300, 800, 750	O	X	—	—	
Severance ?	KXOE	—	Union Sulphur Co.	—	—	—	—	—	
Sewalls Point *	KGX	200	U.S. Shipping Board	300, 450, 600	P G	N	0.20	—	
Swickley *	KPH	200	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Seypen *	WGEU	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Shanock *	KOBB	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Sharkey *	NULV	—	Navy	300, 600	P G	N	0.20 11	—	
Sharon KIRK *	KIRK	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Shaume *	KILQ	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Shaw *	NKU	—	Navy	300, 600	P G	N	0.20 11	—	
Shawmut *	NML	—	Navy	300, 600	P G	N	0.20 11	—	
Shenandoah *	KIBD	—	U.S. Shipping Board	300, 600	P G	X	0.40	—	
Shenango *	KTC	200	Gulf Refining Co.	300, 600	P G	X	0.20 11	—	
Sheridan WXJ *	WXJ	300	U.S. Army Transport	600	P G	N	—	—	
Sheridan KMQ *	KMQ	250	Sherman S.S. Co.	300, 450, 600	P G	X	0.20 11	—	
Sherman WXK *	WXK	300	U.S. Army Transport	600	P G	N	0.40 11	—	
Stickbunny *	KIZP	—	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Shirk *	NUJV	—	Navy	300, 600	P G	N	0.20 11	—	
Shooters Island *	KERG	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Shotsville *	KIKK	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Shoshone *	KOO	—	Shoshone Nav. Corp.	300, 600	P G	N	0.20	—	
Sialia *	NNV	—	Navy	300, 600	P G	N	0.20 11	—	
Siboney *	WRN	—	U.S. Shipping Board	300, 600	P G	N	0.40 11	—	
Sierra KRW *	KRW	200	E. K. Wood Lumber Co.	300, 450, 600	P G	X	0.20	—	
Sierra WHJ *	WHJ	150	Oceanic S.S. Co.	300, 600, 1,800	P G	N	0.20 11	—	
Siglo (El) *	KKS	200	Southern Pacific Co.	300, 450, 600	P G	N	0.40	—	
Sigourney *	NAJB	—	Navy	300, 600	P G	N	0.20 11	—	
Siletz *	KODG	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
							0.40 11	0.20	

Call Letters	Frequency	Company	Power	Class	Notes	Remarks
WVU	200	Jenkins S.S. Co.	300, 450, 600	PG	X	0.10
Sir Trevor Dawson	150	Canada S.S. Lines	300, 600	PG	X	0.20 11
Sixaola	500	United Fruit Co.	300, 600	PG	N	0.40 13
Skagway	100	Alaska S.S. Co.	300, 600	PG	X	0.40
Slocum	—	Government	300, 600	PG	X	0.20 11
S. M. Fischer	200	Reid Towing & Wrecking Co.	300, 600	PG	X	—
Smith Thompson	—	Navy	300, 600	PG	N	0.10
S. M. Spalding	—	Pan-Amer. Petroleum & Trans. Co.	—	—	—	0.20 11
Snohomish	200	U.S. Coastguard Dept.	300, 600	PG	N	0.40 13
Snug Harbour	200	U.S. Shipping Board	300, 450, 600	PG	X	0.20 11
S.O. Co. No. 91	100	Standard Oil Co. of California	300, 600	PG	X	0.40 13
S.O. Co. No. 93	100	Standard Oil Co. of California	300, 600	PG	X	0.20 11
S.O. Co. No. 95	100	Standard Oil Co. of California	300, 600	PG	X	0.40 13
Socony	250	Standard Oil Co. of N.Y.	300, 600	PG	X	0.20 11
Socony 82	200	Standard Oil Co. of N.Y.	300, 600	PG	X	0.40 13
Socony 83	200	Standard Oil Co. of N.Y.	300, 450, 600	PG	X	0.20 11
Socony 84	200	Standard Oil Co. of N.Y.	300, 450, 600	PG	X	0.40 13
Socony 85	—	Standard Oil Co. of N.Y.	300, 600	PG	—	0.20 11
Socony 88	200	Standard Oil Co. of N.Y.	300, 450, 600	PG	X	0.40 13
Socony 89	200	Standard Oil Co. of N.Y.	300, 450, 600	PG	X	0.20 11
Socony 90	200	Standard Oil Co. of N.Y.	300, 600	PG	X	0.40 13
Socony 92	—	Standard Oil Co. of N.Y.	300, 600	PG	X	0.20 11
Socony 94	200	Standard Oil Co. of N.Y.	300, 450, 600	PG	X	0.40 13
Sol (E1)	200	Southern Pacific Co.	300, 450, 600	PG	N	0.20 11
Solace	—	Navy	300, 600	PG	N	0.40 13
Sol Navis	—	U.S. Shipping Board	300, 600	PG	N	0.20 11
Somers	—	Navy	300, 600	PG	N	0.40 13
Somerset KSU	300	Standard Oil Co. of N.J.	300, 450, 600	PG	X	0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Sonoma NTG *	NTG	—	Navy	300, 600	P G	N	Francs.	—	Francs.
Sonoma WHM ¹	WHM	250	Oceanic S.S. Co.	300, 600, 1,800	P G	N	0.20 11	—	0.20 11
Soroyomo *	NUX	—	Navy	300, 600	P G	N	0.40	—	0.40 12
South American *	WEO	125	Chicago Duluth & Georgian Bay S.S. Co.	300, 600	P G	N	0.20 11	—	0.40 12
Southard *	NAJK	—	—	300, 600	P G	N	0.10	—	0.40 12
South Bend *	KEXQ	—	U.S. Army Transport	300, 600	P G	N	0.20 11	—	0.40 12
South Carolina *	NSW	—	Navy	300, 600	P G	N	—	—	0.40 12
South Dakota *	NSX	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
South Pole *	WDIA	300	U.S. Shipping Board	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 43 *	NUBB	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 54 *	NUBK	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 103 *	NUFK	—	Navy	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 179 *	NUDF	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 181 *	NEFS	—	Navy	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 185 *	NUFZ	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 191 *	NUDB	—	Navy	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 206 *	NUCM	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 210 *	NUDZ	—	Navy	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 214 *	NUCX	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12
S.P. 227 *	NUXG	—	Navy	300, 600	P G	N	0.40 12	—	0.40 12
S.P. 236 *	NUCN	—	Navy	300, 600	P G	N	0.20 11	—	0.40 12

S.P. 238 •	..	NUDN	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 249 •	..	NUCZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 265 •	..	NUCT	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 267 •	..	NUFF	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 269 •	..	NASF	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 311 •	..	NUFJ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 319 •	..	NAVK	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 328 •	..	NELJ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 333 •	..	NCP	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 336 •	..	NUFD	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 340 •	..	NUBZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 399 •	..	NUFG	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 411 •	..	NUBN	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 416 •	..	NDX	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 463 •	..	NUBQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 493 •	..	NDV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 510 •	..	NUDV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 516 •	..	NUCQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 517 •	..	NUDD	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 522 •	..	NUBT	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 525 •	..	NUDX	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 533 •	..	NUCD	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 563 •	..	NUBG	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 572 •	..	NUBV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 573 •	..	NUCG	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 582 •	..	NUCB	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 585 •	..	NUBD	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
S.P. 599 •	..	NUCN	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
S.P. 617*	NUDP	—	Navy	300, 800	P G ..	N	Francs.	—	
S.P. 642*	NUCS	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 666*	NUDC	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 691*	NUBJ	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 707*	NUDR	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 726*	NURS	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 738*	NUCC	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 765*	NUCK	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 838*	NUFL	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 909*	NUBC	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 967*	NUCP	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 1047*	NUFP	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 1138*	NERP	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 1149*	NUFN	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 1234*	NUCJ	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 1240*	NUFC	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 2047*	NAQM	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 2225*	NECD	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 2373*	NUDK	—	Navy	300, 800	P G ..	N	0.40 12	—	
S.P. 3028*	NUHM	—	Navy	300, 800	P G ..	N	0.20 11	—	
S.P. 3207*	NUHR	—	Navy	300, 800	P G ..	N	0.40 12	—	

Spokane *	WGE	100	Pacific S.S. Co. .. ..	..	300, 600	P G	..	N	0.40 12 0.20 11 0.40 12
Sprigg Carroll *	WZU	30	Government .. ..	..	300, 600	P G	..	X	0.40 12
Sproston *	NEVT	—	Navy .. ..	..	300, 600	P G	..	X	— 11 0.20 11 0.40 12
Stadacona *	WMIO	150	Stadacona S.S. Co. ..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Standard KIC *	KIC	200	Standard Oil Co. of N.J.	..	300, 450, 600	P G	..	X	0.40 12 0.20 11 0.40 12
Standard KXOI *	KXOI	—	Standard Transportation Co.	..	300, 450, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Standard II *	KSA	200	Standard Transportation Co.	..	300, 600	P G	..	X	0.40 12 0.20 11 0.20 11
Standard Arrow *	KSV	250	Standard Transportation Co.	..	300, 450, 600	P G	..	X	0.40 12 0.20 11 0.40 12
Standish *	NUY	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Stanley KISJ *	KISJ	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.40 12 0.20 11 0.40 12
Stanley Dollar *	WHS	150	Dollar S.S. Line ..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Stansbury *	NEXV	—	Navy .. ..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.40 12
Stanwood *	KHD	—	W. R. Chamberlin & Co.	..	—	—	..	—	—
Star I *	WRIO	150	U.S. Whaling Co. ..	..	300, 600	P G	..	X	0.20 11 0.40 12 0.40 12
Starlite *	KPK	200	Standard Oil Co. of N.J.	..	300, 450, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Star of Greenland *	KERF	200	Alaska Packers Association	..	300, 400, 600	P G	..	X	0.40 12 0.20 11 0.40 12
Star of Lapland *	KXOA	200	Alaska Packers Association	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Star *	WPS	100	San Juan Fishing and Packing Co.	..	300, 600	P G	..	X	0.40 12 0.20 11 0.40 12
State of Ohio *	WFR	100	Cleveland and Buffalo Transit Co.	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Steadfast *	WDEO	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11 0.40 12 0.20 11
Stephen R. Jones *	KXX	—	Crowell and Thurlow S.S. Co.	..	300, 600	P G	..	—	0.20 11 0.40 12 0.20 11
Sterling NNL *	NNL	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Sterrett *	NTB	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Stevens *	NAPK	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Stockton *	NEO	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Stoddert *	NALZ	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Strathnaver *	KIPP	—	U.S. Shipping Board	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12
Stribling *	NAVS	—	Navy .. ..	..	300, 600	P G	..	N	0.20 11 0.40 12 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.							Frans.	Frans.	
Stringham ..	NACP	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sturgeon Bay ?	KTOI	—	U.S. Shipping Board ..	300, 600	P G ..	N	0.40 18	—	
Sturtevant ..	NUJP	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 1 *	NOBB	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 2 *	NOBC	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 3 *	NOBD	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 4 *	NOBF	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 17 *	NOBJ	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 18 *	NOBK	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 19 *	NOBL	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 20 *	NOBM	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 21 *	NOBN	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 22 *	NOBP	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 23 *	NOBQ	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 24 *	NOBR	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 25 *	NOBS	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 26 *	NOBT	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 27 *	NOBV	—	Navy ..	300, 600	P G ..	N	0.40 18	—	
Sub-chaser 35 *	NOBZ	—	Navy ..	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 36 *	NOCB	—	Navy ..	300, 600	P G ..	N	0.40 18	—	

Sub-chaser 37 *	NOCC	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 38 *	NOCD	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 40 *	NOCG	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 42 *	NOCK	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 43 *	NOCL	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 44 *	NOCM	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 45 *	NOCN	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 46 *	NOCP	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 47 *	NOCO	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 48 *	NOCR	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 49 *	NOCS	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 50 *	NOCT	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 51 *	NOCV	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 52 *	NOCX	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 53 *	NOCZ	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 54 *	NODB	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 55 *	NODC	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 56 *	NODD	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 57 *	NODF	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 58 *	NODG	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 62 *	NODM	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 63 *	NODN	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 64 *	NODP	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 68 *	NODQ	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 69 *	NODR	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 70 *	NODS	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 71 *	NODT	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13
Sub-chaser 72 *	NODV	—	Navy	..	..	..	..	300, 800	PG ..	N	0.20 11 0.40 13

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sub-chaser 73 *	NODX	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 74 *	NODZ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 77 *	NOFB	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 82 *	NOFJ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 90 *	NOFS	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 91 *	NOFT	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 93 *	NOFX	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 95 *	NOGB	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 96 *	NOGC	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 97 *	NOGD	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 98 *	NOGF	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 99 *	NOGG	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 100 *	NOGJ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 101 *	NOCK	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 102 *	NOGL	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 103 *	NOGM	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 104 *	NOGN	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 105 *	NOGP	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 106 *	NOGQ	—	Navy	300, 600	P G ..	N	0.20 11 0.40 18	—	

Sub-chaser 116 *	NOJF	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 117 *	NOJG	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 118 *	NOJJ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 119 *	NOJK	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 120 *	NOJL	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 121 *	NOJM	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 123 *	NOJP	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 125 *	NOJR	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 126 *	NOJS	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 128 *	NOJV	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 129 *	NOJX	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 132 *	NOKC	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 133 *	NOKD	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 134 *	NOKF	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 135 *	NOKG	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 136 *	NOKJ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 137 *	NOKK	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 138 *	NOKL	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 139 *	NOKM	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 143 *	NOKN	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 144 *	NOKP	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 145 *	NOKQ	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 147 *	NOKR	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11
Sub-chaser 148 *	NOKS	—	Navy	..	..	..	300, 600	PG	..	N	0.40 12 0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sub-chaser 152 *	NOKZ	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 153 *	NOLB	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 154 *	NOLC	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 155 *	NOLD	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 156 *	NOLF	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 158 *	NOLJ	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 159 *	NOLK	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 164 *	NOLL	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 165 *	NOLM	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 166 *	NOLN	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 167 *	NOLP	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 168 *	NOLQ	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 177 *	NOLR	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 178 *	NOLS	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 180 *	NOLV	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 181 *	NOLX	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 182 *	NOLZ	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 183 *	NOMB	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 184 *	NOMC	—	Navy	300, 600	P G ..	N	0.20 11	—	
Sub-chaser 185 *	NOMD	—	Navy	300, 600	P G ..	N	0.40 12	—	
Sub-chaser 186 *	NOMF	—	Navy	300, 600	P G ..	N	0.20 11	—	

Sub-chaser 189 *	NOMK	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 190 *	NOML	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 191 *	NOMM	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 192 *	NOMN	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 193 *	NOMP	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 194 *	NOMQ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 195 *	NOMR	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 196 *	NOMS	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 198 *	NOMV	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 199 *	NOMX	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 204 *	NONF	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 206 *	NONJ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 207 *	NONK	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 208 *	NONL	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 209 *	NONM	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 210 *	NONN	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 211 *	NONP	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 212 *	NONQ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 213 *	NONR	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 214 *	NONS	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 215 *	NONT	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 216 *	NONV	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 217 *	NONX	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11
Sub-chaser 218 *	NONZ	—	Navy	..	..	..	300, 600	P G	..	N	0.40 12 0.20 11

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sub-chaser 220 *	NOPB	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 221 *	NOPC	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 222 *	NOPD	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 223 *	NOPF	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 224 *	NOPG	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 225 *	NOPJ	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 226 *	NOPR	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 228 *	NOPM	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 229 *	NOPN	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 230 *	NOPP	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 231 *	NOPQ	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 232 *	NOPR	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 233 *	NOPS	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 234 *	NOPT	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 235 *	NOPV	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 236 *	NOPX	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 237 *	NOPZ	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 238 *	NOQB	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	
Sub-chaser 239 *	NOQC	—	Navy	300, 800	P G ..	N	0.20 11 0.40 18	—	

Sub-chaser 240 *	NOQD	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 241 *	NOQF	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 242 *	NOQG	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 244 *	NOQJ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 245 *	NOQK	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 246 *	NOQL	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 247 *	NOQM	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 248 *	NOQN	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 250 *	NOQP	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 251 *	NOQQ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 253 *	NOQS	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 254 *	NOQT	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 255 *	NOQV	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 256 *	NOQX	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 257 *	NOQZ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 258 *	NORB	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 259 *	NORC	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 260 *	NORD	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 261 *	NORF	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 262 *	NORG	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 263 *	NORJ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 264 *	NORK	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 265 *	NORL	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 266 *	NORM	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 268 *	NORP	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 269 *	NORQ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 270 *	NORR	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13
Sub-chaser 271 *	NORS	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 13

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sub-chaser 272 *	NORT	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 273 *	NORV	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 274 *	NORX	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 275 *	NORZ	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 276 *	NOSB	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 277 *	NOSC	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 278 *	NOSD	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 279 *	NOSF	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 280 *	NOSG	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 281 *	NOSJ	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 282 *	NOSK	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 283 *	NOSL	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 284 *	NOSM	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 287 *	NOSQ	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 288 *	NOSR	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 289 *	NOSS	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 290 *	NOST	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 291 *	NOSV	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 292 *	NOSX	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 293 *	NOSY	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 294 *	NOSZ	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 295 *	NOTA	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 296 *	NOTB	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 297 *	NOTC	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 298 *	NOTD	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 299 *	NOTE	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 300 *	NOTF	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 301 *	NOTG	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 302 *	NOTH	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 303 *	NOTI	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 304 *	NOTJ	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 305 *	NOTK	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 306 *	NOTL	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 307 *	NOTM	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 308 *	NOTN	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 309 *	NOTO	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 310 *	NOTP	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 311 *	NOTQ	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 312 *	NOTR	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 313 *	NOTS	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 314 *	NOTT	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 315 *	NOTU	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 316 *	NOTV	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 317 *	NOTW	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 318 *	NOTX	—	Navy	300, 600	P G	N	0.20 11	—	
Sub-chaser 319 *	NOTY	—	Navy	300, 600	P G	N	0.40 12	—	
Sub-chaser 320 *	NOTZ	—	Navy	300, 600	P G	N	0.20 11	—	

Sub-chaser 290 *	NOIG	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 299 *	NOTJ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 300 *	NOTK	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 301 *	NOTL	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 302 *	NOTM	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 303 *	NOTN	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 304 *	NOTP	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 305 *	NOTQ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 306 *	NOTR	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 307 *	NOTS	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 308 *	NOTT	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 309 *	NOTV	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 310 *	NOTX	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 311 *	NOTZ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 312 *	NOVB	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 320 *	NOVC	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 321 *	NOVD	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 322 *	NOVF	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 323 *	NOVG	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 326 *	NOVL	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 328 *	NOVN	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 329 *	NOVP	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 330 *	NOVQ	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 331 *	NOVR	—	Navy	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Sub-chaser 332 *	NOVS	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 333 *	NOVT	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 334 *	NOVV	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 335 *	NOVX	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 336 *	NOVZ	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 338 *	NOXC	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 339 *	NOXD	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 340 *	NOXF	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 341 *	NOXG	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 351 *	NOXQ	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 352 *	NOXR	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 353 *	NOXS	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 354 *	NOXT	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 356 *	NOXX	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 405 *	NOXZ	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 407 *	NOZB	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 408 *	NOZC	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 409 *	NOZD	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13
Sub-chaser 410 *	NOZF	—	Navy	300, 600	P G ..	N	—	—	0.20 11 0.40 13

Sub-chaser 415*	NOZM	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 416*	NOZN	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 417*	NOZP	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 418*	NOZQ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 419*	NOZR	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 420*	NOZS	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 421*	NOZT	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 422*	NOZV	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 423*	NOZX	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 424*	NOZZ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 425*	NIQB	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 426*	NIQC	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 427*	NIQD	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 428*	NIQE	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 429*	NIQG	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 430*	NIQJ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 432*	NIQL	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 434*	NIQN	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 435*	NIQP	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 436*	NIQQ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 439*	NIQT	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 440*	NIQV	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 441*	NIQX	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Sub-chaser 442*	NIQZ	—	Navy	..	..	..	..	300, 600	PG	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.							Francs.	Francs.	
Sub-chaser 443 *	NIRB	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sub-chaser 444 *	NIRC	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sub-chaser 445 *	NIRD	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sub-chaser 446 *	NIRF	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sub-chaser 447 *	NIRG	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sub-chaser 448 *	NIRJ	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sucrosa *	KNS	300	Cuba Distilling Co.	300, 600	P G	X	0.20 11 0.40 13	—	
Sud (El) *	KKQ	200	Southern Pacific Co.	300, 600	P G	X	0.20 11 0.40 13	—	
Sudbury KRZ *	KRZ	150	Shawmut S.S. Co.	300, 450, 600	P G	X	0.20 11 0.40 13	—	
Suffolk WRS *	WRS	—	Coastwise Transportation Co.	—	P G	—	0.20 11 0.40 13	—	
Sumac *	NASG	—	Navy	300, 600	P G	X	0.20 11 0.40 13	—	
Sun *	KTU	250	Sun Company	300, 600	P G	X	0.20 11 0.40 13	—	
Sunbeam *	KODC	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 13	—	
Sunflower *	NUFM	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sunlite *	KPQ	200	Standard Oil Co. of N.J.	300, 450, 600	P G	X	0.20 11 0.40 13	—	
Sunnadin *	NEVB	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Sunoi *	KWP	200	Sun Company	300, 450, 600	P G	X	0.20 11 0.40 13	—	
Supply *	NTK	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Suriname *	KLI	350	United Fruit Co.	300, 600	P G	N	0.20 11 0.40 13	—	
Suruga *	KGD	300	N.Y. & Oriental S.S. Co.	300, 450, 600	P G	X	0.20 11 0.40 13	—	
Surveyor *	NQU	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	

Suwanee WLY *	WLY	100	U.S. Shipping Board	..	300, 600	PG	..	N	0.20
S. V. Harkness *	KEU	300	Standard Oil Co. of N.J.	..	300, 450, 600	PG	..	—	0.20 11
Swallow *	NEFL	—	Navy	..	300, 600	PG	..	N	0.40 12
Swampscott ?	WQU	—	U.S. Shipping Board	..	300, 600	PG	..	N	0.20 11
Swan Nijp *	NIJP	—	Navy	..	300, 600	PG	..	N	0.40 12
Swasey *	NIGP	—	Navy	..	300, 600	PG	..	N	0.20 11
Sylph *	NTL	—	Navy	..	300, 600	PG	..	N	0.40 12
Sylvan Arrow *	KSX	250	Standard Transportation Co.	..	300, 600	PG	..	X	0.20 11
Sylvia *	NARQ	—	Navy	..	300, 600	PG	..	N	0.40 12
S. Alicia *	WSJ	150	Grace S.S. Co.	..	300, 450, 600	PG	..	X	0.20 11
S. Ana WAL ?	WAL	100	Alaska S.S. Co.	..	300, 600	PG	..	X	0.40 12
S. Ana WBX *	WBX	—	Grace S.S. Co.	..	300, 600	PG	..	X	0.20 11
S. Augustine *	KIKJ	—	U.S. Shipping Board	..	300, 600	PG	..	X	0.20 11
S. Barbars *	WBj	200	Grace S.S. Co.	..	300, 450, 600	PG	..	X	0.40 12
S. Catalina *	WBC	200	Atlantic & Pacific S.S. Co.	..	300, 600	PG	..	X	0.20 11
S. Cecilia *	WBB	200	Nafra Company	..	300, 600	PG	..	X	0.40 12
S. Charles *	KOK	200	Maru Nav. Co.	..	300, 600	PG	..	X	0.20 11
S. Clara *	WBA	200	Atlantic & Pacific S.S. Co.	..	300, 600	PG	..	X	0.40 12
S. Cruz WBD *	WBD	200	Atlantic & Pacific S.S. Co.	..	300, 600	PG	..	X	0.20 11
S. Elena *	WBZ	200	Grace S.S. Co.	..	300, 450, 600	PG	..	X	0.40 12
S. Eliza *	NEFD	—	Navy	..	300, 600	PG	..	N	0.20 11
S. Flavia *	KRUI	300	Grace S.S. Co.	..	300, 450, 600	PG	..	X	0.40 12
S. Francis *	KRT	200	U.S. Steel Products Co.	..	300, 600	PG	..	X	0.20 11
S. Francisco NTQ *	NTQ	—	Navy	..	300, 600	PG	..	N	0.40 12
S. Inex *	WSI	100	Grace S.S. Co.	..	300, 600	PG	..	X	0.20 11
S. Isabel WHN *	WHN	200	Grace S.S. Co.	..	300, 450, 600	PG	..	X	0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
S. Jacinto *	KES	200	Mallory S.S. Co. ..	300, 450, 600	P G	N	Frans.	—	
S. Johns County *	KIKG	—	U.S. Shipping Board	300, 600	P G	X	0.20 11	0.40 13	
S. Jose KDJ *	KDJ	300	United Fruit Co. ..	300, 450, 600	P G	X	0.20	0.40	
S. Jose WWL *	WWL	150	Pacific Mail S.S. Co. ..	300, 600	P G	X	0.40	0.40	
S. Juan KGJ *	KGJ	300	N.Y. & Porto Rico S.S. Co. ..	300, 450, 600	P G	X	0.20 11	0.40 13	
S. Juan WWM *	WWM	150	Pacific Mail S.S. Co. ..	300, 600	P G	N	0.20 11	0.40 13	
S. Leonora *	KIML	300	U.S. Shipping Board	300, 600	P G	N	0.20 11	0.40 13	
S. Louis NTF *	NTF	—	Navy ..	300, 600	P G	N	0.20	0.40 13	
S. Luis *	NEZ	—	Navy ..	300, 600	P G	N	0.20 11	0.40 13	
S. Luisa *	KJEU	350	Grace S.S. Co. ..	300, 450, 600	P G	N	0.20 11	0.40 13	
S. Malta *	KIBN	—	U.S. Shipping Board	300, 600	P G	N	0.20 11	0.40 13	
S. Marcos *	KEK	200	Mallory S.S. Co. ..	300, 600	P G	X	0.20 11	0.40 13	
S. Marta *	KLK	500	United Fruit Co. ..	300, 600	P G	X	0.20 11	0.40 13	
S. Mateo *	KLJ	300	United Fruit Co. ..	300, 600	P G	X	0.20 11	0.40 13	
S. Nicholas *	WSS	100	Columbia River Packers Assn. ..	300, 600	P G	N	0.40	0.40	
S. Olivia *	KQII	—	Atlantic & Pacific S.S. Co. ..	300, 525, 600	P G	X	0.40	0.40	
S. Paul KSO *	KSO	200	International Mercantile Marine Co. ..	300, 600	P G	X	—	0.20	
S. Paula *	WBQ	250	Grace S.S. Co. ..	300, 600	P G	N	—	0.20 11	
S. Pedro *	WZZ	30	Government	600	P G	X	0.20 11	0.40 13	
S. Ramon *	WNW	150	San Ramon S.S. Co. ..	300, 600	P G	X	0.40 13	0.40 13	
S. Rita WBR *	WBR	300	Grace S.S. Co. ..	300, 450, 600	P G	X	0.20 11	0.40 13	
S. Rita WTC *	WTC	100	Sun Company ..	300, 600	P G	X	0.20 11	0.40 13	
S. Rosa *	WBO	250	Grace S.S. Co. ..	300, 450, 600	P G	X	0.20 11	0.40 13	
S. Romalia *	KLO	200	U.S. Steel Products Co. ..	300, 600	P G	X	0.20 11	0.40 13	

S. Tecla *	..	KNEE	150	Grace S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12
S. Teresa *	..	WLIA	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	—	0.20
Tacoma NUA *	..	NUA	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tacony *	..	WLB	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Tadousac *	..	NAZQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Talbot *	..	NAPL	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tallahassee *	..	NUC	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tallapoosa *	..	NRE	200	U.S. Coastguard Dept.	..	..	..	600, 756, 952	P G	..	N	0.20 11 0.40 12
Tamesi *	..	WTV	200	Freight & Tampico Trans. Corp.	Fuel Oil	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Tanager *	..	NABS	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tanamo *	..	KVN	300	Atlantic Fruit Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Tanka *	..	KEFF	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tarbell *	..	NEZP	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tartar *	..	KEKS	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	X	0.20
Tasco *	..	RFT	—	T. A. Scott Co.	..	..	..	300, 600	P G	..	X	0.15 11
Tatnuck *	..	NETQ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tatoosh *	..	WPE	1,000	Western Fuel Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Tattal *	..	NEPS	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tavernilla *	..	KEMT	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	—	0.20 11 0.40 12
Taylor *	..	NALR	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Teal *	..	NAPN	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Tennessee *	..	NSE	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Teresa WJF *	..	WJF	200	U.S. Shipping Board	..	..	..	300, 450, 600	P G	..	X	0.20
Tern NIKT *	..	NIKT	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Terry *	..	NUI	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Texas *	..	WKT	250	Amer.-Hawaiian S.S. Co.	..	..	..	300, 600	P G	..	X	0.20 11 0.40 12
Texarkana *	..	KOCD	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20
Texas KUM *	..	KUM	300	Texas S.S. Co.	..	..	..	300, 450, 600	P G	..	X	0.20 11 0.40 12
Texas NCD *	..	NCD	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Texas WBOE *	..	WBOE	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	—	0.20
Thala *	..	KIQQ	—	U.S. Shipping Board	..	..	..	300, 600	P G	..	N	0.20
Thatcher *	..	NESV	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12
Theodore Roosevelt *	..	NATZ	—	Navy	..	..	..	300, 600	P G	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
Thetis NRT ..	NRT	150	U.S. Coastguard Dept. ..	300, 600	P G ..	N	—	—	—
Thomas NIFN ..	NIFN	—	Navy ..	300, 600	P G ..	N	—	—	—
Thomas WXM ..	WXM	300	U.S. Army Transport ..	600	P G ..	N	—	—	—
Thompson NAZC ..	NAZC	—	Navy ..	300, 600	P G ..	N	—	—	—
Thornton ..	NWX	—	Navy ..	300, 600	P G ..	N	—	—	—
Thrush ..	NIKS	—	Navy ..	300, 600	P G ..	N	—	—	—
Ticonderoga ..	NAPR	—	Navy ..	300, 600	P G ..	N	—	—	—
Tidewater ..	KOU	300	Natva Company ..	300, 450, 600	P G ..	N	—	—	—
Tiger ..	KIT	300	Standard Transportation Co. ..	300, 450, 600	P G ..	X	—	—	—
Tillamook ?	WMOA	—	U.S. Shipping Board ..	300, 600	P G ..	X	—	—	—
Tillman ..	NEQT	—	Navy ..	300, 600	P G ..	N	—	—	—
Tingey ..	NWY	—	Navy ..	300, 600	P G ..	N	—	—	—
Tionesta ..	WCA	150	Erie & Western Trans. Co. ..	300, 600	P G ..	N	—	—	—
Tippicanoe ..	NUGV	—	Navy ..	300, 600	P G ..	N	—	—	—
Tipton ?	WQOA	200	U.S. Shipping Board ..	300, 600	P G ..	X	—	—	—
Tivives ..	KMI	500	United Fruit Co. ..	300, 600	P G ..	N	—	—	—
Toller ..	WTOO	1000	U.S. Shipping Board ..	300, 600	P G ..	X	—	—	—
Toka ..	KPAE	200	U.S. Shipping Board ..	300, 600	P G ..	N	—	—	—
Toledo ..	KTV	200	Sun Co. ..	300, 600	P G ..	X	—	—	—
Tollard ..	KEVX	300	U.S. Shipping Board ..	300, 600	P G ..	X	—	—	—
Telo ..	WQOI	—	U.S. Shipping Board ..	300, 600	P G ..	N	—	—	—
Tonopah ..	NUN	—	Navy ..	300, 600	P G ..	N	—	—	—
Topeka ..	NLY	—	Navy ..	300, 600	P G ..	N	—	—	—

Topila *	..	KKE	200	Southern Pacific Co.	..	..	300, 450, 600	PG	..	X	0.20 11 0.40 18
Tormentor *	..	KFN	100	Freeport & Tampico Fuel Oil Trans. Corp.	..	..	300, 600	PG	..	X	0.20 11 0.40 18
Torres *	..	KKF	250	Southern Pacific Co.	..	..	300, 600	PG	..	X	0.20 11 0.40 18
Toucey *	..	NULX	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tracey *	..	NUJL	—	Navy	..	..	330, 600	PG	..	N	0.20 11 0.40 18
Transportation * Traveller *	..	KEJX	—	Coastwise Transportation Co.	..	..	—	PG	..	—	0.20
Trevel *	..	KIVK	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Trinidadian *	..	NUMP	200	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Trinity *	..	KNO	—	Gulf Refining Co.	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tripp *	..	NUGX	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tripp *	..	KIMC	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tripp *	..	NUQ	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Triumph *	..	KEND	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20
Trontolite *	..	KOM	—	Standard Oil Co. of N.J.	..	..	300, 600	PG	..	—	0.20 11 0.40 18
Troy *	..	NADJ	—	Navy	..	..	300, 600	PG	..	X	0.20 11 0.40 18
Tuckahoe *	..	KJOU	125	U.S. Shipping Board	..	..	300, 450, 600	PG	..	X	0.20
Tuckanuck *	..	KIMB	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 18
Tucker *	..	NKV	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tulip *	..	NXX	—	Bureau of Lighthouses	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Tulsa *	..	KIXR	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20
Tunica *	..	WJF	150	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Turkey *	..	NIJF	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Turner *	..	NERO	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Turrialba *	..	KDT	500	Turrialba S.S. Corp.	..	..	300, 600	PG	..	N	0.40
Tuscarora NRL *	..	NRL	200	U.S. Coastguard Dept.	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Twiggs *	..	NEPV	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
Twilite *	..	KPO	200	Standard Oil Co. of N.J.	..	..	300, 450, 600	PG	..	—	0.20 11 0.40 18
Tyce KENB *	..	KENB	—	U.S. Shipping Board	..	..	300, 600	PG	..	—	0.20
Tyce WPC *	..	WPC	—	U.S. Shipping Board	..	..	—	PG	..	X	0.20
Tyce WSO *	..	WSIO	100	U.S. Shipping Board	..	..	300, 600	PG	..	—	0.20
U.111 *	..	NEVG	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
U.117 *	..	NEXK	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
U.148 *	..	NERD	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18
U.B.88 *	..	NESD	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 18

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
U.C.97	NEQP	—	Navy	300, 600	P G	N	Francs.	Francs.	
Ulysses KPU	KPU	300	Panama R.R. Co.	300, 600	P G	N	—	—	
Unatilla	KSUO	—	U.S. Shipping Board	300, 600	P G	X	—	—	
Unpqua	NATS	—	Navy	300, 600	P G	N	—	—	
Unalga	NRX	200	—	600, 756, 952	P G	N	—	—	
Uncas NVF	NVF	—	Navy	300, 600	P G	N	—	—	
Undaunted NNX	NNX	—	Navy	300, 600	P G	N	—	—	
Undaunted WGM	WGM	—	Hind-Rolph & Co.	300, 600	P G	N	—	—	
United States KZU	KZU	300	E. H. R. Green	—	P G	N	—	—	
Upshur	NERS	—	Navy	300, 450, 600	P G	N	—	—	
Utah	NVE	—	Navy	300, 600	P G	N	—	—	
Utna	KIPM	—	U.S. Shipping Board	300, 600	P G	N	—	—	
Utoka	KERK	—	U.S. Shipping Board	300, 600	P G	N	—	—	
Utownah	NJI	—	Navy	300, 600	P G	N	—	—	
Vacuum II	KIMK	—	Jesse H. Jay	300, 600	P G	X	—	—	
Valdez	WAK	100	Alaska S.S. Co.	300, 600	P G	N	—	—	
Valette NUJT (La)	NUJT	—	Navy	300, 600	P G	X	—	—	
Valle (El)	KKW	200	Southern Pacific Co.	300, 600	P G	N	—	—	
Vanada	KQBF	—	U.S. Shipping Board	300, 600	P G	X	—	—	
Valero	WHV	50	G. Allan Hancock	—	P G	N	—	—	
Venecia	WOB	100	I. D. S. S. S. Co.	300, 600	P G	X	—	—	
Venezuela WBG	WBG	200	Pacific Mail S.S. Co.	300, 600	P G	X	—	—	
Ventura	WVK	150	Granite S.S. Co.	300, 600	P G	X	—	—	
Ventura	WVK	150	Granite S.S. Co.	300, 600	P G	X	—	—	
Vestal	NAM	—	Standard Transportation Co.	300, 600	P G	N	—	—	
Venusius	NVM	—	Navy	300, 600	P G	N	—	—	

Vigo KMC ⁶	..	KMC	300	Vigo S.S. Co.	..	..	300, 450, 600	PG	..	X	0.20 11 0.40 12
Villalobos ⁹	..	NVP	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Vincent ³	..	KIZS	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Vireo ⁶ ..	..	NIKL	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Virginia KUV ³	..	KUV	300	Texas Company	..	..	300, 450, 600	PG	..	X	0.20 11 0.40 12
Virginia NVR ⁹	..	NVR	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Virginian NAXG ⁹	..	NAXG	—	Amer.-Hawaiian S.S. Co.	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Virginian WKV ³	..	WKV	350	—	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Vittorie Emmanuel III ⁵	..	KBUI	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Vixen ⁹ ..	..	NSU	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Vizcaya	..	WSQ	—	—	..	..	—	—	..	—	—
Volunteer ³	..	WFAO	300	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Von Stueben ⁹	..	NACC	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Vulcan ⁹	..	NVT	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Waban ⁶	..	KJT	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Wabash ³	..	WNC	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Wacha ⁶	..	WPPE	—	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Wachusett ³	..	WJL	100	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Waco ⁵ ..	..	KIRP	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wacouta ³	..	WLG	200	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wadsworth ⁹	..	NKW	—	Navy	..	..	300, 450, 600	PG	..	N	0.20 11 0.40 12
Wahkeena ⁵	..	WMS	200	Chas. R. McCormick & Co.	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wahkiakum ⁷	..	KNIA	200	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wainwright ⁹	..	NULF	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Wakan ³	..	WDIA	200	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wakanna ³	..	KKOU	200	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wakiki ⁶	..	WRUU	—	U.S. Shipping Board	..	..	300, 600	PG	..	X	0.20 11 0.40 12
Wakulla ³	..	KRUO	200	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Walden ³	..	KIGG	300	U.S. Shipping Board	..	..	300, 600	PG	..	N	0.20 11 0.40 12
Walke ⁹	..	NWL	—	Navy	..	..	300, 600	PG	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiogram.	
UNITED STATES OF AMERICA—contd.									
Walker *	NESX	—	Navy	300, 600	P G	N	Francs. 0.20 11	Francs. —	
Wallingford *	KEPV	—	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
Wallkill *	KIPD	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Wallowa *	KQAI	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Walula *	WPY	100	Port of Portland	300, 450, 600	P G	X	0.20	—	
Walter A. Luckenbach *	KJIE	—	Luckenbach Co.	300, 600	P G	X	0.20	—	
Walter D. Munson *	KVJ	200	Munson S.S. Lines	300, 450, 600	P G	X	0.20	—	
Walter D. Noyes *	KDY	—	Crowell & Thurlow S.S. Co.	300, 600	P G	X	—	—	
Walter Hardcastle *	KQB	300	Sinclair Nav. Co.	300, 600	P G	X	0.20	—	
Wampum *	KROI	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Wana * 10	KYX	100	Geo. C. Sherman	300, 600	P	X	—	—	
Wandank *	NARF	—	Navy	300, 600	P G	N	0.20 11	—	
Wanderer NNS *	NNS	—	Navy	300, 600	P G	N	0.40 12	—	
Waneyanda *	WXIE	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Wanau *	WDAU	—	U.S. Shipping Board	300, 600	P G	—	0.20 11	—	
Wapama *	WMG	100	Chas. R. McCormick & Co.	300, 600	P G	N	0.20 11	—	
Warbler *	NIKM	—	Navy	300, 600	P G	N	0.40 12	—	
Warren *	WXN	300	U.S. Army Transport	600	P G	N	0.20 11	—	
Warrington *	NWD	—	Navy	300, 600	P G	N	0.40 12	—	
Wasco ?	KKIO	200	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
Washington NWE *	NWE	—	Navy	300, 600	P G	N	0.40 12	—	
Washenaw *	WPOO	300	Union Oil Co. of California	300, 600	P G	X	0.20 11	—	
Wasmuth *	NUKC	—	Navy	300, 600	P G	N	0.40 12	—	
Wasp *	NSV	—	Navy	300, 600	P G	N	0.20 11	—	
Wassac ?	KROO	300	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
Watauga *	WQT	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Waters *	NAT	—	Navy	300, 600	P G	N	0.20 11	—	
Watertown *	KING	—	U.S. Shipping Board	300, 600	P G	N	0.40 12	—	
Watthens ?	WDIE	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Watowan ?	WDII	300	U.S. Shipping Board	300, 600	P G	N	0.20 11	—	
							0.40 12	—	
							0.20	—	
							0.20	—	

W. B. Keene	W. C. Teagle	Welika	Welborn C. Wood	Wellies	Wellington KMR	Wenakee	Wenonah	West Alcoa	West Aleta	West Alesk	West Amargosa	West Apau	West Arcoe	West Arveda	West Ashawa	West Avenal	Westboro	West Bridge	Westbrook	West Cactus	West Caddoa	West Calfort	West Calumb	West Cape	West Carnifax	West Carruth	West Catanae	West Cavanal	West Caython	West Cayote	West Celeron	West Cellina	West Chatala	West Cherow	Westchester	West Cheswald	West Chetac	West Coast	West Cobalt	West Cohas		
100	200	—	—	—	100	—	—	—	300	300	300	300	200	300	—	300	150	300	300	300	200	—	—	300	300	300	300	300	—	300	—	300	200	—	—	300	—	—	300	300	300	300
KWK	KTY	KIXX NULJ	—	NAJZ	KMR	WXII NJJ	—	KIDD	KIQG	KJOO	KEJS	KJUU	WKS	KVIE	KFHI	KENG	KBUU	KJOO	KIVI	KODF	KEXX	KILT	WXEO	KEFC	KEEJ	KEE	KIFD	KILZ	KIRF	KKJ	KEZR	KIPJ	KJMN	WCL	KIXB	KIMG	KRAA	KEKD	KNAE			
Savannah-N.Y. Trans. Co.	Standard Oil Co. of N.J.	U.S. Shipping Board Navy	—	Navy	H. W. Cook	U.S. Shipping Board Navy	—	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board	U.S. Shipping Board		
300, 600	300, 600	300, 600 300, 600	—	300, 600	300, 450, 800	300, 600 300, 600	—	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600	300, 600
0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	0.20 11	0.40 12	
X	X	X	N	N	X	X	N	X	X	X	X	N	N	X	X	X	X	X	X	X	X	X	X	N	N	N	N	N	N	N	N	N	N	X	N	X	X	N	N	N	N	X

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge. Per Word. Radio-telegram.	Remarks.
UNITED STATES OF AMERICA—contd.								
West Compo ⁷	KENJ	—	U.S. Shipping Board	300, 600	P G	X	Francs.	
West Combs ³	KIFP	—	U.S. Shipping Board	300, 600	P G	X	—	
West Corum ⁷	KEVD	300	U.S. Shipping Board	300, 600	P G	X	—	
West Cressy ³	WGOU	300	U.S. Shipping Board	300, 600	P G	X	—	
West Durfee ⁷	KJAI	300	U.S. Shipping Board	300, 600	P G	X	—	
West Eagle ⁷	WQZ	300	U.S. Shipping Board	300, 387, 600	P G	X	—	
West Ekronk ³	KQUJ	300	U.S. Shipping Board	300, 600	P G	X	—	
West Elcajon ³	KELK	300	U.S. Shipping Board	300, 600	P G	X	—	
West Eleasco ⁷	WJOA	300	U.S. Shipping Board	300, 600	P G	X	—	
West Eldara ³	WJOE	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Ally ⁷	KEJF	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Belle ⁷	WKUI	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Chief ⁵	KNAO	300	U.S. Shipping Board	300, 600	P G	X	—	
Western City ³	KNAI	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Comet ⁷	WXEI	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Cross ⁵	KTEE	300	U.S. Shipping Board	300, 600	P G	X	—	
Westerner ⁵	KIK	100	U.S. Shipping Board	300, 600	P G	X	—	
Western Front ⁷	WJQ	—	U.S. Shipping Board	300, 600	P G	X	—	
Western Glen ³	KEDR	—	U.S. Shipping Board	300, 600	P G	X	—	
Western Hero ⁷	KIU	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Hope ⁵	WFAT	300	U.S. Shipping Board	300, 600	P G	X	—	
Western King ⁵	WEP	150	U.S. Shipping Board	300, 600	P G	X	—	
Western Knight ⁷	KEFQ	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Light ⁷	KQOI	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Maid ⁵	KQOO	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Ocean ⁷	KJEA	—	U.S. Shipping Board	300, 600	P G	X	—	
Western Plains ⁷	WZIU	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Pride ³	WGT	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Queen ⁷	WWK	300	U.S. Shipping Board	300, 377, 600	P G	X	—	
Western Scout ³	WXFA	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Sea ³	KNEA	300	U.S. Shipping Board	300, 600	P G	X	—	
Western Spirit ⁵	KNEA	300	U.S. Shipping Board	300, 600	P G	X	—	
Western States ³	WED	100	U.S. Shipping Board	300, 600	P G	X	—	
Western Wave ⁷	WWC	300	U.S. Shipping Board	300, 600	P G	X	—	
Westerner ⁵	KKEJ	300	U.S. Shipping Board	300, 600	P G	X	—	
Westerner ⁵	KKEJ	300	U.S. Shipping Board	300, 600	P G	X	—	
Westerner ⁵	KKEJ	300	U.S. Shipping Board	300, 600	P G	X	—	
West Indian ³	KVNU	500	Shipping Board	300, 600	P P	ZZZZ	Francs.	
West Cancho ³	KQDU	500	Shipping Board	300, 600	P P	ZZZZ	—	
West Gramma ³	WGJA	500	Shipping Board	300, 600	P P	ZZZZ	—	

West Galoc *	KVEI	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Gambo *	KOUU	300	U.S. Shipping Board	..	..	300, 600	P	..	N	0.20
West Goronska *	WGT	300	U.S. Shipping Board	..	..	300, 600	P	..	N	0.20
West Grana *	WGIA	300	U.S. Shipping Board	..	..	300, 600	P	..	N	0.20
West Grove *	WSP	150	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
Westhampton *	KJAU	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Harcuvar *	WSP	300	U.S. Shipping Board	..	..	300, 378, 600	P	..	X	0.20
West Hardaway *	KEZM	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hargrave *	KEDX	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Harlan *	KEFS	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Harshaw *	KEFX	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hartland *	KEGS	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hartley *	KEGT	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Harts *	KEFZ	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hasayampa *	KEGX	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Haven *	KJV	200	U.S. Shipping Board	..	..	300, 450, 600	P	..	X	0.20
West Helix *	WSUA	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hematite *	KEZP	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hembride *	KEZN	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Henshaw *	KEBQ	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Heppburn *	KINF	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hobonac *	WFAI	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hosokie *	WFEL	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Hunhaw *	WZAE	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Imboden *	KECX	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Indian *	KJAE	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Inskip *	KITZ	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Irmo *	KITP	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Islay *	KICP	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Isleta *	KICQ	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Islip *	KIKX	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Ison *	KINN	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Jaffrey *	KOCX	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Kasson *	KIKM	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Katon *	KOBK	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Keene *	KISK	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Kyska *	WJOU	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Lake *	WTH	300	U.S. Shipping Board	..	..	300, 378, 600	P	..	X	0.20
Westland *	KJX	100	U.S. Shipping Board	..	..	300, 450, 525, 600	P	..	X	0.20
West Lashaway *	WREA	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Langa *	KJAO	300	U.S. Shipping Board	..	..	300, 376, 600	P	..	X	0.20
West Loquassuck *	WJOI	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Madaket *	WJOO	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Mahomet *	WIUU	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Maximus *	KEDQ	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
Westmead *	WDIO	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Modus *	KENK	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
Westmoreland *	KIOC	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Mount *	KBUE	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Munham *	KEXF	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Nohno *	KEXG	300	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Nosska *	KEDV	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
Westoil *	KIVP	—	U.S. Shipping Board	..	..	300, 600	P	..	X	0.20
West Pocasset *	KOCK	—	San Juan Fishing & Packing Co. U.S. Shipping Board	..	..	300, 600	P	..	X	0.20

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
West Point *	KJY	150	U.S. Shipping Board	300, 450, 600	P G	N	0.20	—	
Westpool *	WKOA	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
Westport *	WFEO	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Quebec *	KEDT	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Raritan *	KIXC	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Saginaw *	KOCV	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Segovia *	KIPK	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Selene *	KIXZ	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Sequana *	WSOI	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Shore *	WMD	100	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Tacook *	KECR	200	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Tegu *	KEXJ	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Totant *	KEXK	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Vaca *	KEMX	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
West View *	WDIU	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
West Virginia *	NEDJ	—	Navy	300, 600	P G	N	0.20 11	—	
Westward Ho *	WKX	50	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
West Wauna *	WSUF	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
West Waunake *	WSUI	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
Westwego *	KGE	200	Union Petroleum S.S. Co.	300, 450, 600	P G	X	0.20 11	—	
West Wind *	KJH	100	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Westwood *	WTF	300	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Zeda *	WKUU	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
West Zucker *	WJIA	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
West Zula *	WJEO	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
W. F. Burrows *	WHG	250	Libby, McNeill & Libby	300, 425, 525, 600	P G	X	0.20 11	—	
W. F. White *	WGC	200	Limestone Transportation Co.	300, 450, 600	P G	X	0.40 12	—	
Wheatland Montana *	KISF	—	U.S. Shipping Board	300, 600	P G	—	0.10	—	
Wheaton *	WMUA	300	U.S. Shipping Board	300, 600	P G	N	0.20	—	
Wheeling *	NWH	—	Navy	300, 600	P G	N	0.20 11	—	
Whipple *	NWI	—	Navy	300, 600	P G	N	0.40 12	—	
Whippoorwill *	NJQ	—	Navy	300, 600	P G	N	0.20 11	0.40 12	

Wico ³ ..	..	KNN	200	Standard Oil Co. of N.J. ..	..	300, 800	PG ..	..	X	0.20 11
Widgeon ⁹ ..	..	NAQF	—	Navy ..	..	300, 800	PG ..	..	N	0.40 12
Wihaha ² ..	..	WDEA	200	U.S. Shipping Board ..	..	300, 800	PG ..	..	X	0.20 11
Wilhelmina ³ ..	..	WMO	250	Matson Nav. Co. ..	..	300, 450, 800	PG ..	..	X	0.40 12
Wilhelm Jebsen ⁵ ..	..	WNQ	200	U.S. Shipping Board ..	..	300, 450, 800	PG ..	..	N	0.20 11
Wilkes ⁹ ..	..	NKQ	—	Navy ..	..	300, 800	PG ..	..	X	0.40 12
Willamette ⁵ ..	..	WSW	100	Willamette S.S. Co. ..	..	300, 800	PG ..	..	N	0.20 11
Willet ⁹ ..	..	NIKN	—	Navy ..	..	300, 800	PG ..	..	N	0.40 12
William A. McKenney ⁶ ..	..	WOM	—	Crowell & Thurlow S.S. Co. ..	..	300, 800	PG ..	..	X	0.10
William A. Reiss ⁶ ..	..	WNI	200	Reiss S.S. Co. ..	..	300, 800	PG ..	..	X	0.20 11
William B. Preston ⁹ ..	..	NUMQ	—	Navy ..	..	300, 800	PG ..	..	X	0.10
William G. Mather ³ ..	..	KKUI	150	Cleveland Cliff Iron Co. ..	..	300, 450, 800	PG ..	..	X	0.20 11
William Green ⁵ ..	..	WITY	250	Petroleum-Trans. Co. ..	..	300, 450, 800	PG ..	..	X	0.40 12
William Isom ⁵ ..	..	KVY	200	U.S. Shipping Board ..	..	300, 450, 800	PG ..	..	X	0.20 11
William Jones ⁹ ..	..	NARR	—	Navy ..	..	300, 800	PG ..	..	N	0.40 12
William M. Mills ⁶ ..	..	KEJT	200	Wm. M. Mills ..	..	300, 800	PG ..	..	X	0.20 11
William N. Page ⁶ ..	..	WFOO	300	U.S. Shipping Board ..	..	300, 800	PG ..	..	X	0.40 12
William O'Brien ⁵ ..	..	KPN	200	Huron Nav. Corp. ..	..	300, 800	PG ..	..	X	0.20 11
Williams ⁹ ..	..	NENT	—	Navy ..	..	300, 800	PG ..	..	N	0.40 12
Willmantic ⁷ ..	..	KMIO	—	U.S. Shipping Board ..	..	300, 800	PG ..	..	N	0.20 11
Willoughby ⁹ ..	..	NJX	—	Navy ..	..	300, 800	PG ..	..	N	0.40 12
Wilmington ⁹ ..	..	NWK	—	Navy ..	..	300, 800	PG ..	..	N	0.20 11
Willcox ⁶ ..	..	WPAO	—	U.S. Shipping Board ..	..	300, 800	PG ..	..	N	0.40 12
Winchester ⁹ ..	..	NUKS	—	Navy ..	..	300, 800	PG ..	..	N	0.20 11
Windber ⁶ ..	..	WND	300	Pacific-Amer. Fisheries ..	..	300, 450, 800	PG ..	..	N	0.40 12
Winding Gulf ⁶ ..	..	WFEE	300	U.S. Shipping Board ..	..	300, 800	PG ..	..	N	0.40 12
Winfred ⁹ ..	..	KTE	200	Gulf Refining Co. ..	..	300, 800	PG ..	..	X	0.20 11
Winnabago KTEI ⁶ ..	..	KTEI	300	Foreign Trans. & Mercantile Corp. ..	..	300, 450, 525	PG ..	..	X	0.40 12
Winnisimmet ⁹ ..	..	NACQ	—	Navy ..	..	300, 800	PG ..	..	N	0.30

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service Performed.	Hours of Service.	Ship Charge.		Remarks.
							Per Word.	Minimum per Radiotelegram.	
UNITED STATES OF AMERICA—contd.									
Winona County ⁶	KIZR	—	U.S. Shipping Board	300, 600	P G	N	Frans.	—	
Winslow ¹	NJA	—	Navy	300, 600	P G	N	0.20 11	—	
Winyah ⁷	KIMM	—	U.S. Shipping Board	300, 600	P G	N	0.20 12	—	
Wisconsin ¹	NWMI	—	Navy	300, 600	P G	N	0.20 11	—	
Wisconsin Bridge ⁶	KIBM	—	U.S. Shipping Board	300, 600	P G	X	0.20 12	—	
Wiskah ⁷	KNEU	—	U.S. Shipping Board	300, 600	P G	—	0.20	—	
Wissahickon ¹	NUEX	—	Navy	300, 600	P G	N	0.20 11	—	
W. L. Steed ⁵	WSEE	300	U.S. Shipping Board	300, 600	P G	N	0.40 12	—	
W. M. Burton ⁶	KMIU	150	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Wm. F. Herrin ¹	WTN	—	Assoc. Oil Company	300, 600, 1,800	P G	X	0.20 11	—	
Wm. G. Warden ⁵	KNF	250	Standard Oil Co. of N.J.	300, 450, 600	P G	X	0.40 12	—	
W. M. Irish ⁶	KJOE	—	U.S. Shipping Board	300, 600	P G	X	—	—	
W. M. Tupper ⁶	WJR	—	Gulf & Southern S.S. Co.	300, 600	P G	X	0.20 11	—	
Wolverine ¹	NGW	—	Navy	300, 600	P G	N	0.40 12	—	
Wompatuck ¹	NVJ	—	Navy	300, 600	P G	N	0.20 11	—	
Wonahbe ⁶	KIBX	—	U.S. Shipping Board	300, 600	P G	X	0.40	—	
Wood ¹	NUMF	—	Navy	300, 600	P G	N	0.20 11	—	
Woodbury ¹	NATM	—	Navy	300, 600	P G	N	0.40 12	—	
Woodcock NIKP ¹	NIKP	—	Navy.	300, 600	P G	N	0.20 11	—	
Woodman ⁵	KIBP	—	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	
Woodruff ⁷	KIPF	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
Woolsey ¹	NATF	—	Navy	300, 600	P G	N	0.20 11	—	
Woonsocket ⁶	WCW	300	U.S. Shipping Board	300, 450, 600	P G	X	0.40 12	—	
Worcester ⁷	KIKL	300	U.S. Shipping Board	300, 600	P G	X	0.20 11	—	
Woyaca ⁷	KETK	—	U.S. Shipping Board	300, 600	P G	X	0.20	—	
W. S. Porter ¹	WTM	150	Assoc. Oil Company	300, 600, 1,800	P G	X	0.20 11	—	
W. S. Rheem ⁶	WGAO	300	U.S. Shipping Board	300, 600	P G	X	0.40 12	—	

Yacona *	NUDP	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12 0.20 11 0.40 12
Yackin *	KWL	200	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Yainax *	WXAE	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yakima *	KNUI	200	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yaklok *	WSOO	—	U.S. Shipping Board	..	300, 600	P G	..	—	0.20
Yakolow *	KIGX	—	U.S. Shipping Board	..	300, 600	P G	..	—	0.20
Yale *	NOQ	—	Navy	..	300, 600	P G	..	N	0.20 11 0.20 12
Yamacraw *	NRV	200	U.S. Coastguard Dept.	..	800, 752, 952	P G	..	N	0.20 11 0.40 12
Yamhill *	WVIE	300	U.S. Shipping Board	..	300, 600	P G	..	N	0.20
Yankton *	NSK	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Yantic *	NHX	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Yaphank *	KOBM	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11 0.40 12
Yaquina *	KENF	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yarborough NUMC *	NUMC	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Yarnall *	NIGS	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Yawah *	KEDF	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11 0.40 12
Yehama *	KVAU	200	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yellowstone *	KJEE	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yesoking *	KERQ	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yocoma *	NUNB	200	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yomachichi *	WPAI	—	U.S. Coastguard Dept.	..	300, 600	P G	..	X	0.20
Yorktown *	NQX	—	Navy	..	300, 600	P G	..	X	0.20 11 0.20 12
Yosemite KVS *	KVS	150	U.S. Shipping Board	..	300, 476, 600	P G	..	X	0.20 11 0.40 12
Yosemite WQY *	WQY	150	Pope & Talbot 3rd & Barry Sts.	..	300, 600	P G	..	X	0.20
Young *	NESG	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Youngstown *	KIFX	300	U.S. Shipping Board	..	300, 600	P G	..	N	0.20 11 0.40 12
Yucca KWJ *	KWJ	200	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yukon *	WXEU	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Yuma *	WJAI	150	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Zaca *	WKOA	300	U.S. Shipping Board	..	300, 600	P G	..	X	0.20
Zacapa *	KLE	500	United Fruit Co.	..	300, 600	P G	..	N	0.20
Zane *	NUMN	—	Navy	..	300, 600	P G	..	N	0.20 11 0.40 12
Zapora *	WPQ	100	Booth Fisheries Co.	..	300, 600	P G	..	X	0.20 11 0.40 12
Zarembo *	KICS	—	U.S. Shipping Board	..	300, 600	P G	..	X	0.20 11 0.40 12
Zavalla *	KEVC	200	Nacirema S.S. Corp.	..	300, 600	P G	..	N	0.20 11 0.40 12

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wavelengths in Metres (the Normal Wavelength in Heavy Type).	Nature of Service Performed.	Hours of Service	Ship Charge.		Remarks.
							Per Word.	Minimum per Radio-telegram.	
UNITED STATES OF AMERICA—contd.									
Zealandia *	NBE	—	Navy	300, 600	P G	N	Francs. 0.20 11 0.40 13	Francs.	
Zellin *	NUMB	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Zenith *	KZE	—	Chas. Longstreth	300, 600	P G	N	0.20 11 0.40 13	—	
Zeppelin *	NIVK	—	Navy	300, 600	P G	N	0.20 11 0.40 13	—	
Zirkel *	WREO	—	U.S. Shipping Board	300, 600	P G	X	0.20 11 0.40 13	—	
Zizania *	NZZ	—	Bureau and Lighthouses	300, 600	P G	N	0.20 11 0.40 13	—	
Zudie *	WPAU	—	U.S. Shipping Board	300, 600	P G	N	0.20 11 0.40 13	—	
Zulia *	KDZ	200	Atlantic & Caribbean S.N. Co.	300, 450, 600	P G	N	0.20 11 0.40 13	—	
URUGUAY									
Baron de Rio Branco	CWG	55	Navy	450, 600	O	—	—	—	
Diez y ocho de Julio	CWF	55	Navy	450, 600	O	—	—	—	
Ingeniero	CWH	55	Navy	600	O	—	—	—	
Montevideo	CWE	220	Navy	450, 600	O	—	—	—	
Oyarvide	CWI	55	Hydrographic Service	450, 600	O	—	—	—	
Uruguay	CWD	220	Navy	450, 600	O	—	—	—	

INTERNATIONAL ALLOCATION OF CALL LETTERS

THE BUREAU INTERNATIONAL DE L'UNION TELEGRAPHIQUE OF BERNE allots to the various nations who are parties to the International Radiotelegraphic Convention combinations of "call" letters, which are in turn allotted to ship and land stations. Below we give a list of the letters, and combinations of letters, and the countries to which these have been assigned.

A	Germany.	OGA to OIZ	Denmark.
B	Great Britain.	OJA to OMZ	<i>Not yet allotted.</i>
CAA to CEZ	Chile.	OUA to OZZ	Denmark.
CFA to CKZ	British Possessions and Protectorates.	PAA to PIZ	Netherlands.
CLA to CMZ	Spain.	PJA to PJM	Curaçao.
CNA to CNZ	Morocco.	PJN to PJZ	Surinam.
COA to COZ	Great Britain.	PKA to PMZ	Dutch Indies.
CPA to CPZ	Bolivia.	PNA to PPZ	Brazil.
CQA to CQZ	Monaco.	PQA to PSZ	Portugal.
CRA to CRZ	Portuguese Colonies.	PTA to PVZ	Brazil.
CSA to CUZ	Portugal.	PWA to PWZ	Cuba.
CVA to CVZ	Roumania.	PXA to PZZ	Netherlands.
CWA to CWZ	Uruguay.	Q	<i>Reserved for abbreviations.</i>
CXA to CXZ	Spain.	R	Russia.
CYA to CZZ	Mexico.	SAA to SMZ	Sweden.
D	Germany.	SNA to STZ	Brazil.
EAA to EHZ	Spain and Colonies.	SUA to SUZ	Egypt.
EIA to EZZ	Great Britain.	SVA to SZZ	Greece.
F	France, French Colonies and Protectorates.	TAA to TEZ	Turkey.
G	Great Britain.	TFA to TFZ	Iceland.
HAA to HAZ	Hungary.	TGA to THZ	Greece.
HBA to HBZ	Switzerland.	TIA to TOZ	Spain.
HCA to H CZ	Ecuador.	TPA to TUZ	Norway.
HDA to HEZ	<i>Not yet allotted.</i>	TQA to TTZ	Norway.
HFA to HFZ	Czecho-Slovakia.	TVA to TZZ	Netherlands.
HGA to HHZ	Siam.	UAA to UMZ	France, French Colonies and Protectorates.
HIA to HIZ	Dominican Republic.	UNA to UNZ	<i>Not yet allotted.</i>
HJA to HKZ	Colombia.	UOA to UOZ	Austria.
HLA to HNU	Spain.	UPA to UPZ	Italy.
HNV to HNZ	New Hebrides.	VAA to VGZ	Canada.
HOA to HZZ	France, French Colonies and Protectorates.	VHA to VKZ	Australian Commonwealth.
I	Italy and Colonies.	VLA to VMZ	New Zealand.
J	Japan and Possessions.	VNA to VNZ	Union of South Africa.
KAA to KCZ	Germany.	VOA to VOZ	Newfoundland.
KDA to KZZ	United States of America.	VPA to VSZ	British Colonies and Protectorates not autonomous.
LAA to LHZ	Norway.	VTa to VWZ	British India.
LIA to LRZ	Argentina.	VXA to VZZ	British Colonies and Protectorates.
LSA to LUZ	Great Britain.	W	United States of America.
LVA to LVZ	Guatemala.	XAA to XDZ	Mexico.
LWA to LWZ	Norway.	XEA to XMZ	Great Britain.
LXA to LZZ	Bulgaria.	XNA to XSZ	China.
M	Great Britain.	XTA to XZZ	Great Britain.
N	United States of America.	Y	Great Britain.
OAA to OBZ	Peru.*	Z	Great Britain.
OCA to OFZ	Great Britain.		
ONA to OTZ	Belgium and Colonies.		

* Provisionally.

CALL LETTERS

(Alphabetically arranged)

ALLOTTED TO LAND AND SHIP STATIONS.

b = Ship Station.

c = Land Station.

		PAGE		PAGE	
ATR	<i>c.</i> Atbara	583	BDP	<i>b.</i> Southern Coast ..	799
BAA	<i>b.</i> Hitchin	763	BDQ	<i>b.</i> Priestfield	790
BAB	<i>b.</i> Trevalgan	804	BDR	<i>b.</i> Swinburne	800
BAD	<i>b.</i> Baymanter	733	BDS	<i>b.</i> City of Birmingham	741
BAF	<i>b.</i> Baylula	733	BDT	<i>b.</i> Pembroke	786
BAH	<i>b.</i> Claymont	747	BDU	<i>b.</i> Valette (La)	771
BAI	<i>b.</i> Glastonbury	758	BDV	<i>b.</i> Visigoth	807
BAJ	<i>b.</i> Abercorn	725	BDY	<i>b.</i> Buckleigh	737
BAK	<i>b.</i> Appleby	728	BDZ	<i>b.</i> Betwa	734
BAM	<i>b.</i> Prairial	790	BEA	<i>b.</i> Frankby	756
BAN	<i>b.</i> Sunray	800	BEB	<i>b.</i> Reval BEB	793
BAR	<i>b.</i> Vitellia	807	BEC	<i>b.</i> Strathearn	799
BAS	<i>b.</i> Oreland	784	BEF	<i>b.</i> Elswick Tower	753
BAU	<i>b.</i> Baron Inchcape	732	BEJ	<i>b.</i> Huntslyde	765
BAV	<i>c.</i> Evère, Brussels	529	BEK	<i>b.</i> Brenden	736
BAW	<i>b.</i> Rio Preto	793	BEL	<i>b.</i> Bayford	733
BBH	<i>b.</i> Butetown	737	BEM	<i>b.</i> Bardic	731
BBI	<i>b.</i> Central No. 1	739	BEN	<i>b.</i> Stroma	799
BBJ	<i>b.</i> City of Belfast	741	BEO	<i>b.</i> Belize	733
BBM	<i>b.</i> Mount Berwyn	780	BEP	<i>b.</i> Kamouraska	768
BBO	<i>b.</i> Thamesmede	803	BEQ	<i>b.</i> Dewsbury	750
BBQ	<i>b.</i> Tynemedde	805	BER	<i>b.</i> Felixstowe	755
BBS	<i>b.</i> Colonia BBS	747	BET	<i>b.</i> Menelaus	778
BBV	<i>b.</i> Corcrest	747	BEU	<i>b.</i> Crosshill	749
BBW	<i>b.</i> War Soldier	811	BEV	<i>b.</i> Bayusona	733
BBX	<i>b.</i> Milton	779	BEX	<i>b.</i> Majestic BEX	774
BCA	<i>b.</i> Chinu	740	BEY	<i>b.</i> King Edward BEY	769
BCB	<i>b.</i> Greleden	761	BFA	<i>b.</i> Dumfries	751
BCC	<i>b.</i> Blackhill	735	BFB	<i>b.</i> Greenwich	761
BCD	<i>b.</i> City	741	BFD	<i>b.</i> Spartan Prince	799
BCE	<i>b.</i> Zelo	813	BFE	<i>b.</i> Royal Sceptre	794
BCG	<i>b.</i> Crown of Navarre	749	BFG	<i>b.</i> Euterpe	755
BCH	<i>b.</i> Crown of Granada	749	BFH	<i>b.</i> Eastgate	752
BCI	<i>b.</i> John Sanderson	767	BFI	<i>b.</i> Heronspool	763
BCL	<i>b.</i> War Prince	810	BFJ	<i>b.</i> Elleric	753
BCP	<i>b.</i> Canadier	738	BFK	<i>b.</i> Santille	795
BCQ	<i>b.</i> Cardigan	739	BFL	<i>b.</i> Renfrew	793
BCR	<i>b.</i> Anglesea	727	BFM	<i>b.</i> Madawaska	773
BCS	<i>b.</i> Capelcastle	738	BFO	<i>b.</i> Gardenia	757
BCT	<i>b.</i> Lady Charlotte	770	BFP	<i>b.</i> Glamorgan	758
BCT	<i>b.</i> Southlea	799	BFS	<i>b.</i> Gyp	761
BCU	<i>b.</i> Clan Keith	743	BFT	<i>b.</i> Grelorm	761
BCV	<i>b.</i> Northern	783	BFV	<i>b.</i> Kilkenny	769
BCZ	<i>b.</i> Apsleyhall	728	BFW	<i>b.</i> Petingaudet	787
BDB	<i>b.</i> Karoa	768	BFX	<i>b.</i> Glenfinlas	759
BDC	<i>b.</i> Glenaffric	758	BFY	<i>b.</i> Poldennis	788
BDD	<i>b.</i> Corby	747	BFZ	<i>b.</i> Polperro	788
BDE	<i>b.</i> Coquetmede	747	BGB	<i>b.</i> Dirk	751
BDF	<i>b.</i> Clydesdale	747	BGE	<i>b.</i> Montcalm BGE	779
BDH	<i>b.</i> Dictator	750	BGH	<i>b.</i> Campus	738
BDI	<i>b.</i> Patrician	786	BGI	<i>b.</i> Nina (La)	771
BDJ	<i>b.</i> Westborough	811	BGK	<i>b.</i> Rio Negro BGK	793
BDK	<i>b.</i> Newquay	782	BGL	<i>b.</i> Ridley	793
BDM	<i>b.</i> Burgandy	737	BGN	<i>b.</i> Newbigging	781
BDN	<i>b.</i> Lady Cloe	770	BGP	<i>b.</i> Ulidia	806
BDO	<i>b.</i> Benmohr	734	BGO	<i>b.</i> Hova BGO	764

		PAGE		PAGE	
BGR	b. Trevesa	805	BNX	b. Chiswick	740
BGS	b. Harlem	762	BNY	b. Pencisely	786
BGU	b. Rochdale	793	BNY	b. Usworth	806
BGX	b. Alexandra BGX ..	727	BNZ	b. Sedbergh	797
BHA	b. War Recruit	810	BOA	b. Bideford	734
BHC	b. Delambre	750	BOB	b. Blairmore	735
BHD	b. War Pilot	810	BOD	b. British Light ..	736
BHE	b. War Veteran	811	BOE	b. Ulua	806
BHF	b. Pilar de Larrinaga ..	787	BOF	b. Frankinver	757
BHH	b. Hatipara	762	BOH	b. Polcrest	788
BHI	b. Glamorganshire ..	758	BOI	b. British Star	736
BHJ	b. War Gunner	809	BOJ	b. Actor	725
BHK	b. War Sapper	810	BOK	b. Admiral Codrington	725
BHL	b. Nucula	783	BOL	b. General Church ..	758
BHP	b. Ngakuta	782	BOM	b. Ethelwynne	755
BIA	c. Bunia-Kilo	528	BON	b. British Lantern ..	736
BIS	b. George V	758	BOP	b. Oakmore	783
BIT	b. Croft	749	BOQ	b. Thistlemore	803
BJJ	b. Marsden	776	BOR	b. War Pundit	810
BJP	b. Reims BJP	792	BOS	b. Darino	749
BJQ	b. Brinkburn	736	BOT	b. Louth	772
BJO	b. Cymric Pride	749	BOU	b. British Beacon ..	736
BJV	b. Gothic	760	BOV	b. Woldingham	812
BJW	b. Elgin	753	BOW	b. Holtby	764
BJX	b. Princess	790	BOY	b. Margha	776
BKB	b. Ellaline	753	BOZ	b. Katanga	768
BKG	b. Ennisbrook	754	BPB	b. Dogra	751
BKM	b. Sir Arthur	798	BPC	b. Saskatoon	796
BKN	b. Kirktown	769	BPD	b. J. H. Plummer ..	767
BKO	b. Mackworth	773	BPE	b. Charybdis	620
BKZ	b. Fullerton	757	BPG	b. Braunfels	736
BLB	b. Kandy	768	BPU	b. Holbrook	764
BLD	b. Kasara	768	BPW	b. War Hermit	809
BLE	b. Melton	777	BPY	b. War Patriot	810
BLF	b. Mercedes BLF ..	778	BQE	b. Ronan	794
BLH	b. Polbain	788	BQF	b. Whinfield	811
BLI	b. Stromness	799	BQK	b. Grelton	761
BLJ	b. S. Theresa	801	BQM	b. War Expert	809
BLN	b. British Major ..	736	BQO	b. War Matron	809
BLP	b. Simoon	798	BQP	b. Grelbank	761
BLR	b. Tecumseh	667	BQQ	b. Elzasier	753
BLV	b. Umgeni	806	BQU	b. New York City ..	782
BLW	b. Umona	806	BQV	b. Wells City	811
BLY	b. Warturm	811	BQW	b. Exeter City	755
BMB	b. Newaster	781	BQX	b. Chicago City	740
BMB	b. War Hamlet	809	BQZ	b. Perez	787
BMD	b. Havildar	762	BRA	b. Jehangir	667
BMK	b. War Beryl	808	BRB	b. Brookvale	737
BMN	b. Twilight	805	BRC	b. War Mingan	809
BMO	b. Corton	748	BRE	b. Kahira (EI)	753
BMQ	b. Keyingham	769	BRG	b. Esturia	755
BMR	b. Kylcakin	770	BRI	b. Frankenfels	756
BMT	b. Trowidden	805	BRM	b. Hunnie	765
BMV	b. Foreric	756	BRP	b. Joffre	767
BMZ	b. Armagh	729	BRS	b. Gibel Yedid	758
BNA	b. Tregothnan	804	BRY	b. Professor BRY ..	791
BNB	b. Melita	777	BRZ	b. Ravenstone	792
BNC	b. Ormonde	785	BSF	b. Vale o'Moray	806
BND	b. Rosefield	794	BSK	b. Hunslet	765
BNE	b. Riverton	793	BSL	b. Min	779
BNF	b. Brighton BNF ..	736	BSN	b. Ryde	795
BNG	b. Isle of Lewis ..	766	BSO	b. Roker	793
BNG	b. Jura	767	BSP	b. Palamcotta	785
BNI	b. Strathlorne	799	BSQ	b. Purnea	791
BNK	b. Mourino	780	BSR	b. Bryntawe	737
BNL	b. General Gordon ..	758	BST	b. War Sorel	811
BNL	b. Hurliness	765	BSW	b. Bradboyne	735
BNQ	b. Turkestan	805	BTA	b. Koursk BTA	770
BNW	b. Dunolly	752	BTC	b. War Mehtar	809

		PAGE			PAGE	
BTB	b. Comino ..	747	BYB	c. Malta, S. Angelo	565	CCV
BTE	b. War Songhee ..	811	BYZ	c. Malta, Rinella Bay	565	CCZ
BTG	b. William Balls ..	812	BZA	c. Inchkeith ..	588	CGA
BTB	b. Eros BTK ..	754	BZB	c. Bermuda ..	529	CCB
BTP	b. Moorby ..	779	BZC	c. Portsmouth Signal School ..	589	CCG
BTR	b. Lackenby ..	770	BZE	c. Matara, Ceylon ..	539	CCD
BTS	b. Carperby ..	739	BZF	c. Aden ..	518	CCG
BTB	b. Barby ..	731	BZG	c. Mauritius ..	566	CCF
BTU	b. Weardale ..	811	BZH	c. Seychelles ..	580	CCG
BTX	b. Kenah ..	769	BZI	c. Durban (Jacobs) ..	581	CGH
BTZ	b. Cormorant BTZ ..	748	BZJ	c. Port Nolloth ..	581	CGI
BUC	b. Bilbster ..	734	BZK	c. Bathurst ..	552	CGK
BUD	b. Wearwood ..	811	BZL	c. Demerara ..	533	CGL
BUE	b. Cronstadt ..	749	BZM	c. St. Johns ..	569	CGM
BUF	b. Petrograd ..	787	BZN	c. Falkland Islands ..	546	CGN
BUG	b. Norfolk Range ..	782	BZO	c. Ascension ..	525	CGO
BUH	b. Harlseywood ..	762	BZQ	c. Christiana, Jamaica ..	534	CGP
BUI	b. Scraps ..	796	BZR	c. Somerset Island ..	529	CGQ
BUK	b. Clan Skene ..	746	BZS	c. Kingsnorth ..	588	CGR
BUL	b. Warora ..	810	BZT	c. Tynemouth ..	591	CGS
BUQ	b. Chilier ..	740	BZU	c. Immingham ..	588	CGT
BUU	b. Seatonia ..	796	BZW	c. Rhyl DF ..	590	CGU
BUV	b. Toloa ..	804	C	c. Camaguey ..	542	CGX
BUX	b. Scabank ..	796	CB	c. Cuabo ..	574	CGY
BUX	b. Rhode Island ..	793	CO	c. Cayo Cristo ..	542	CGZ
BUY	b. Overdale ..	785	CW	c. Munich ..	553	CHN
BVG	c. Berwick DF ..	586	CAA	b. Aysen ..	623	CHO
BVH	c. Harwich BVH ..	588	CAB	b. Maipo CAB ..	624	CHP
BVL	c. Peterhead DF ..	589	CAC	b. Cachapoal ..	623	CHQ
BVN	c. Flamborough DF ..	587	CAH	b. Huasco ..	623	CHR
BVO	c. Perim ..	573	CAI	b. Imperial ..	623	CHS
BVY	c. Lizard DF ..	589	CAL	b. Limari ..	624	CHV
BVZ	c. Carnsore DF ..	586	CAM	b. Mapocho ..	624	CHW
BWH	c. Harwich BWH ..	588	CAP	b. Palena ..	624	CHZ
BWK	c. Kingstown ..	588	CBA	b. Chacabuco ..	623	CJE
BWP	c. Ponta Delgada ..	527	CBB	b. Blanco ..	623	CJG
BWW	c. Gibraltar, North Front ..	554	CBC	b. Cochrane ..	623	CJH
BXF	c. Famagusta ..	543	CBD	b. Condell ..	623	CJI
BXH	c. St. Helena ..	579	CBE	b. Esmeralda ..	623	CJJ
BXJ	c. Larne DF ..	588	CBF	b. Talcahuano ..	624	CJK
BXK	c. Seaview DF ..	590	CBG	b. Gamero ..	623	CJL
BXV	c. Amlwch DF ..	586	CBH	b. O'Higgins ..	623	CJN
BXW	c. Singapore (Seletar) ..	565	CBI	b. Errazuriz ..	624	CJO
BXY	c. Stonecutters Island ..	557	CBJ	b. Jarpa ..	623	CJP
BYA	c. Whitehall London ..	591	CBK	b. Casma ..	623	CJQ
BYB	c. Cleethorpes ..	586	CBM	b. Tomé ..	624	CJR
BYC	c. Horsea ..	588	CBN	b. O'Brien CBN ..	624	CJS
BYD	c. Aberdeen ..	585	CBO	b. Orella ..	624	CJT
BYE	c. Ipswich ..	588	CBP	b. Prat ..	623	CJU
BYF	c. Pembroke ..	589	CBQ	b. Baquedano ..	624	CKB
BYH	c. Rosyth ..	590	CBR	b. Riquelme ..	624	CKD
BYI	c. Scarborough Rad ..	590	CBS	b. Serrano ..	624	CKE
BYJ	c. Felixstowe ..	587	CBT	b. Thompson CBT ..	624	CKF
BYK	c. Sheerness ..	590	CBU	b. Maipo CBU ..	624	CKG
BYL	c. Dover ..	587	CBW	b. Rancagua ..	623	CKH
BYM	c. Culver Cliff ..	587	CBX	b. Ex-Cochrane ..	624	CKI
BYN	c. Portland Bill ..	589	CBY	b. Lynch ..	624	CKJ
BYO	c. Rame Head ..	590	CBZ	b. Zenteno ..	539	CKK
BYP	c. Cromarty ..	587	CCA	c. Arica ..	539	CKP
BYQ	c. Corkbeg ..	587	CCB	c. Antofagasta ..	539	CKS
BYR	c. Bunbeg ..	586	CCH	c. Huafu ..	539	CKT
BYS	c. Portpatrick ..	589	CCJ	c. Juan Fernandez ..	539	CKU
BYT	c. Stockton ..	590	CCL	c. Llanquihue ..	539	CLA
BYU	c. Lerwick Rad ..	589	CCM	c. Mocha ..	539	CLB
BYV	c. Grimsby Rad ..	587	CCO	c. Coquimbo ..	539	CLC
BYW	c. Gibraltar, Rock ..	554	CCP	c. Punta Arenas ..	539	CLD
BYX	c. Gibraltar, Windmill Hill ..	554	CCR	c. Raper ..	539	CLE
			CCT	c. Talcahuano ..	539	CLF

	PAGE		PAGE	
c. Valparaiso ..	539	CLG	b. Torpedero No. 18 ..	718
c. Evangelistas ..	539	CLH	b. Torpedero No. 19 ..	718
b. Australrange ..	610	CLI	b. Torpedero No. 20 ..	718
b. Australplain ..	610	CLJ	b. Torpedero No. 21 ..	718
b. Australbush ..	610	CLK	b. Torpedero No. 22 ..	718
b. Australglen ..	610	CLL	b. Torpedero No. 23 ..	718
b. Australford ..	610	CLM	b. Torpedero No. 24 ..	718
b. Australdale ..	610	CLZ	c. La Carraca ..	582
b. Australstream ..	610	CMA	b. Apolo ..	711
b. Booral ..	610	CMB	b. Algorteo ..	711
b. Kanna ..	697	CMC	b. Nuria ..	716
b. Dredge No. 3 ..	611	CMD	b. Faustino R. San	
b. Toromeo ..	613		Pedro ..	714
b. Cooee ..	611	CME	b. Eolo ..	713
b. Australbrook ..	610	CMF	b. José Villalonga ..	715
b. Carawa ..	610	CMG	b. Victor Chavarri ..	719
b. Sumatra CGP ..	612	CMH	b. Hercules ..	714
b. Kurumba ..	611	CMI	b. Iturri Azkar ..	715
b. Winfield ..	613	CMJ	b. Jupiter CMJ ..	715
b. Cycle ..	611	CMK	b. Claudio ..	713
b. Melusia ..	611	CML	b. Maria Milagros ..	716
b. Changsha ..	611	CMM	b. Marte CMM ..	716
b. Macedon ..	611	CMN	b. Enrique Ballesteros ..	713
b. Taiyuan ..	612	CMO	b. Olavarria ..	716
b. Apolda ..	609	CMP	b. Oiz ..	716
b. Vologda CHN ..	807	CMQ	b. Marzo ..	716
b. Laketon ..	621	CMR	b. Ramon ..	717
b. Wethersfield ..	623	CMS	b. Alava ..	711
b. Lingan ..	621	CMT	b. Bartolo ..	712
b. Hochelaga ..	621	CMU	b. Junio ..	715
b. Ocamo ..	622	CMV	b. Begonia No. 4 ..	712
b. Turret Cape ..	623	CMW	b. Albal ..	711
b. Reginolite ..	622	CMX	b. Valencia CMX ..	719
b. Turret Court ..	623	CMY	b. Euzkera ..	714
b. A. E. McKinstry ..	619	CMZ	b. Conde de Zubiria ..	713
b. Empress of Japan ..	620	CNA	c. Agadir ..	567
b. Empress of Russia ..	621	CNF	c. Rabat ..	567
b. Empress of Asia ..	620	CNJ	b. Faci ..	696
b. Guiana ..	621	CNK	b. Meknassi ..	696
b. Talaralite ..	623	CNK	c. Kenitra ..	567
b. Glenmavis ..	621	CNL	b. Kanguro ..	715
b. Impoco ..	621	CNM	b. Marrakchi ..	696
b. Kerry Range ..	621	CNP	c. Casablanca, Maroc ..	567
b. Korona ..	621	CNP	b. Chetaba-gonio ..	567
b. Lord Dufferin ..	621	CNT	b. Taroudant ..	696
b. Manxman ..	621	CNW	c. Tanger ..	567
b. Monteagle ..	622	CNY	c. Mogador ..	567
b. Newona ..	622	CPA	c. Ballivián ..	529
b. Parima ..	622	CPB	c. Fortin D'Orbigny ..	529
b. Renvoyle ..	622	CPC	c. Fortin Esteros de	
b. Glenisle ..	621		Patino ..	529
b. Canora ..	620	CPD	c. Yacuiba ..	530
b. E. B. Osler ..	620	CPE	c. Riberalta ..	530
b. Emperor ..	620	CPF	c. Viacha ..	530
b. J. H. G. Haggarty ..	621	CPG	c. Cobija ..	529
b. Martian ..	621	CPH	c. Trinidad ..	530
b. Midland King ..	621	CPI	c. Villa Bella ..	530
b. Midland Prince ..	621	CPJ	c. Cachuela Esperanza ..	529
b. W. D. Matthews ..	623	CPK	c. Guayaramerin ..	530
b. Collingwood ..	620	CPL	c. Manoa ..	530
b. Canadian Voyageur ..	620	COA	b. Hirondelle ..	696
b. Canadian Pioneer ..	620	CRC	c. Cabinda ..	523
b. Watuka ..	623	CRG	b. Congo ..	703
b. Torpedero No. 15 ..	718	CRH	c. Huambo ..	523
b. Torpedero No. 16 ..	718	CRH	b. Gaza ..	703
b. Torpedero No. 17 ..	718	CRI	b. Lagos ..	703
b. Delin CLD ..	713	CRJ	b. Lourenço Marques ..	704
b. Dorado ..	713	CRK	b. Maio CRK ..	704
b. Gaviota CLF ..	714	CRL	b. Sines ..	704

		PAGE			PAGE
CRL	c. Loanda	523	CUQ	b. Quelimane	704
CRM	c. Mossamedes	523	CUS	b. S. Jorge	704
CRM	b. Porto Alexandre	704	CVC	b. Regele Carol I.	705
CRN	b. Faro	703	CVD	b. Dacia	705
CRN	c. Novo Redondo	523	CVF	b. Imparatul Traian	705
CRO	c. Lobito	523	CVM	b. Principesa Maria	705
CRR	b. Porto	704	CVR	b. Romania	705
CRV	c. Moçambique	576	CVS	c. Constantza-Tunnel	577
CRW	b. Sacavem	704	CWA	c. Cerrito	606
CRX	b. Figueira	703	CWB	c. Isla de Lobos	606
CRY	c. Inhambane	576	CWC	c. Banco Ingles	606
CRZ	c. Lourenço Marques	576	CWD	b. Uruguay CWD	932
CSA	b. Africa CSA	702	CWE	b. Montevideo CWE	932
CSB	b. Beira CSB	703	CWF	b. Diez y Ocho de Julio	932
CSC	b. Sado	704	CWG	b. Baron de Rio Branco	932
CSC	b. Cazengo	703	CWH	b. Ingeniero	932
CSD	b. Dondo	703	CWI	b. Oyarvide	932
CSE	b. Mossamedes	704	CXA	b. Antonia Mumbrú	711
CSF	b. Funchal	703	CXB	b. Galea	714
CSG	b. Ferno Veloso	703	CXC	b. Camproa	713
CSG	b. Guine	703	CXD	b. Mercedes CXD	716
CSH	b. Angola	702	CXE	b. Manuel Opaliw	715
CSI	b. Gaia	703	CXF	b. Mar del Norte	715
CSJ	b. Extremadura CSJ	703	CXG	b. Ogon	716
CSK	b. Coimbra	703	CXH	b. Mar Mediterraneo	716
CSL	b. Loanda	703	CXI	b. Ibai Luze	714
CSM	b. Moçambique	704	CXJ	b. Leonora	715
CSN	b. Lima CSN	703	CXK	b. Ibai Aurre	714
CSO	b. Bolama	703	CXL	b. Ollargan	716
CSP	b. Portugal	704	CXM	b. Cabo Menor	713
CSQ	b. Cunene	703	CXN	b. Onton	717
CSR	b. Peninsular	704	CXO	b. Otayo	717
CSS	b. S. Miguel	704	CXP	b. Manuela Pla	715
CST	b. Tras-os-Montes	705	CXQ	b. Oquendo	717
CSU	b. Insulano	703	CXR	b. Mar Cantabrico	715
CSV	b. Cabo Verde	703	CXS	b. Cabo Caroeira	713
CSW	b. Pangim	704	CXT	b. Teresa Fabregas	718
CSX	b. Peniche	704	CXU	b. Artigan Mendi	712
CSY	b. Ambaca	702	CXV	b. Villaozdr	719
CSZ	b. Zaire	705	CXW	b. Marques de Campo	716
CTA	b. Almirante Reis	702	CXX	b. S. Mamés	717
CTB	b. Vasco da Gama	705	CXY	b. Yandiola	719
CTC	b. Adamaster	702	CXZ	b. Guipuzcoa	714
CTD	b. San Gabriel	704	DA	c. Darmstadt	553
CTE	b. Republica CTE	704	DK	c. Berlin Wolff	553
CTF	b. Espadarte	703	DM	c. Berlin	553
CTG	b. Douro CTG	703	DR	c. Dortmund	553
CTG	c. Cartagena, Colombia	541	DAC	b. Achilles DAC	651
CTH	b. Guadiana CTH	703	DAE	b. Neubau 76	652
CTI	b. Tejo	704	DAI	b. Annie-Hugo Stinnes	651
CTJ	b. Cinco d'Outubro	703	VI	.. ..	651
CTK	b. Beira CTK	703	DAO	b. Arfeld	651
CTL	b. Ibo	703	DAR	b. Adler	651
CTM	b. Vulcano CTM	705	DAT	b. Arbeit	651
CTN	b. Republica CTN	704	DCN	b. Cronshagen	651
CTO	b. Gil Eannes	703	DCW	b. Capri DCW	651
CTP	b. Pedro Nunes	704	DCX	b. Ceuta	651
CTQ	b. Kionga	703	DDD	b. Sonnenberg	653
CTR	b. Berrio	703	DDU	b. Deutschland	651
CTV	c. Lisbon (Monsanto)	576	DEI	b. Einigkeit	651
CTY	b. Chaimite	703	DER	b. Erato	651
CTZ	b. Patria CTZ	704	DES	b. Ernst-Hugo Stinnes	651
CUA	b. Goa	703	XI	.. ..	651
CUC	b. Amarante	702	DEY	b. Bubendey	651
CUH	b. Mormugao	704	DFI	b. Friesland DFI	652
CUI	b. India	703	DFK	b. Friedrich Carl	651
CUJ	b. Granja	703	DFF	b. Gretchen Müller	652
CUM	b. Minho	704	DFS	b. Fuchs	652
CUO	b. Viana	705	DFU	b. Friedrich Franz IV	652

		PAGE			PAGE
DFV	<i>b. Mecklenburg DFV</i> ..	652	EAV	<i>c. Vigo</i> ..	583
DGM	<i>b. Grimm</i> ..	652	EAY	<i>c. S. Isabel de Fernan-</i>	
DGR	<i>b. Grüssgott</i> ..	652		<i>do Pó</i> ..	547
DHB	<i>b. Helene Blumenfeld</i>	652	EBA	<i>b. Espana</i> ..	713
DHE	<i>b. Herkules</i> ..	652	EBB	<i>b. Alfonso XIII. EBB</i>	711
DHH	<i>b. Heinrich-Hugo Stin-</i>		EBC	<i>b. Jaime I</i> ..	715
	<i>nes VII</i> ..	652	EBD	<i>b. Pelayo</i> ..	717
DHK	<i>b. Hera</i> ..	652	EBE	<i>b. Carlos V</i> ..	713
DHS	<i>b. Helios DHS</i> ..	652	EBF	<i>b. Cataluña EBF</i> ..	713
DHZ	<i>b. Herzogin Cécilie</i> ..	652	EBG	<i>b. Princesa d'Asturias</i>	717
DID	<i>b. Iduna</i> ..	652	EBH	<i>b. Reina Regente</i> ..	717
DIU	<i>b. Sirius DIU</i> ..	653	EBI	<i>b. Giralda</i> ..	714
DJY	<i>b. Eisbrecher Berlin</i> ..	651	EBJ	<i>b. Estremadura EBJ</i> ..	714
DJZ	<i>b. Eisbrecher Pommer</i>	651	EBK	<i>b. Rio de la Plata</i>	
DKH	<i>b. Caroline Hemsoth</i> ..	651		<i>EBK</i> ..	717
DKQ	<i>b. Kaiser</i> ..	652	EBL	<i>b. Infanta Isabel EBL</i>	714
DKV	<i>b. Dittmar Koel</i> ..	651	EBM	<i>b. Alvaro de Bazán</i> ..	711
DKW	<i>b. Kiew</i> ..	652	EBN	<i>b. Almirante Lobo</i> ..	711
DLA	<i>b. Lisboa DLA</i> ..	652	EBO	<i>b. Bustamante</i> ..	712
DLK	<i>b. Loki</i> ..	652	EBP	<i>b. Villamici</i> ..	719
DLM	<i>b. Ralum</i> ..	653	EBO	<i>b. Cardarso</i> ..	713
DMA	<i>b. Mannheim</i> ..	652	EBR	<i>b. Bonifaz</i> ..	712
DMV	<i>b. Möwe DMV</i> ..	652	EBS	<i>b. Lauria</i> ..	715
DMW	<i>b. Möwe</i> ..	652	EBT	<i>b. Laya</i> ..	715
DNI	<i>b. Niobe DNI</i> ..	652	EBU	<i>b. Recalde</i> ..	717
DNJ	<i>b. Najade</i> ..	652	EBV	<i>b. Nautilus</i> ..	716
DNX	<i>b. Nixe</i> ..	652	EBW	<i>c. Le Ferrol</i> ..	582
DOB	<i>b. Lothar Bohlen</i> ..	652	EBX	<i>c. Cartagena</i> ..	582
DOE	<i>b. Ostsee</i> ..	652	EBY	<i>c. S. Fernando Cádiz</i>	583
DOH	<i>b. Otto-Hugo Stinnes</i>		EBZ	<i>c. Madrid EBZ</i> ..	582
	<i>IX</i> ..	652	ECA	<i>b. Balmes</i> ..	712
DOJ	<i>b. Condor DOJ</i> ..	651	ECB	<i>b. Barcelona</i> ..	712
DPA	<i>b. Paul</i> ..	653	ECC	<i>b. Cádiz</i> ..	713
DPC	<i>b. Preussen DPC</i> ..	653	ECD	<i>b. Angel B. Perez</i> ..	711
DPD	<i>b. Prinzessin Heinrich</i>	653	ECE	<i>b. Emilia S. de Perez</i>	713
DPF	<i>b. Pawnee DPF</i> ..	653	ECF	<i>b. Carolina E. de Perez</i>	713
DPI	<i>b. Prinz Eitel Friedrich</i>	653	ECG	<i>b. Arriluze</i> ..	712
DPP	<i>b. Prinzessin Sophie</i>		ECH	<i>b. Mar Rojo</i> ..	716
	<i>Charlotte</i> ..	653	ECI	<i>b. Ines ECI</i> ..	714
DPY	<i>b. Poseidon</i> ..	653	ECJ	<i>b. Jaime Girona</i> ..	715
DRB	<i>b. Roland</i> ..	653	ECK	<i>b. Cabo tres Forcas</i> ..	713
DRI	<i>b. Regina DRI</i> ..	653	ECL	<i>b. P. Claris</i> ..	717
DSC	<i>b. Schelde</i> ..	653	ECM	<i>b. Mar Tirreno</i> ..	716
DSE	<i>b. Seeadler</i> ..	653	ECN	<i>b. Marques de Urguijo</i>	716
DSH	<i>b. Seehund</i> ..	653	ECO	<i>b. Mouro</i> ..	716
DSN	<i>b. Schwan</i> ..	653	ECP	<i>b. Miguel M. Pinillos</i>	716
DSO	<i>b. Soneck</i> ..	653	ECQ	<i>b. Roger de Lluria</i> ..	717
DSS	<i>b. Seestern</i> ..	653	ECR	<i>b. Teresa Taya</i> ..	718
DVB	<i>b. Bagdad DVB</i> ..	651	ECS	<i>b. Rosario ECS</i> ..	717
DVI	<i>b. Viola</i> ..	653	ECT	<i>b. Catalina</i> ..	713
DVL	<i>b. Villareal DVL</i> ..	653	ECU	<i>b. Cabo Cervera</i> ..	713
DVS	<i>b. Vorwärts</i> ..	653	ECV	<i>b. Mar Negro</i> ..	716
DWO	<i>b. Wotan DWO</i> ..	653	ECW	<i>b. Conde Wifredo</i> ..	713
DWX	<i>b. Martha Woermann</i>	652	ECX	<i>b. Galdames</i> ..	714
DWJ	<i>b. Lili Woermann</i> ..	652	ECY	<i>b. Infanta Isabel ECY</i>	714
DXJ	<i>b. Rom</i> ..	653	ECZ	<i>b. Martin Saenz</i> ..	716
DXN	<i>b. Cette</i> ..	651	EDA	<i>b. Alicante</i> ..	711
DXO	<i>b. Florenz</i> ..	651	EDB	<i>b. Buenos Aires EDB</i>	712
DZE	<i>b. Zeus</i> ..	653	EDC	<i>b. Cataluna EDC</i> ..	713
DXZ	<i>b. Fritz Stauss</i> ..	652	EDD	<i>b. Alfonso XII</i> ..	711
EAA	<i>c. Aranjuez</i> ..	582	EDE	<i>b. Yute</i> ..	719
EAB	<i>c. Barcelona EAB</i> ..	582	EDF	<i>b. Adelina</i> ..	711
EAC	<i>c. Cádiz EAC</i> ..	582	EDG	<i>b. Legazpi</i> ..	715
EAF	<i>c. Cabo Finisterre</i>	582	EDH	<i>b. C. Lopez y Lopez</i> ..	713
EAL	<i>c. Las Palmas</i> ..	535	EDI	<i>b. Infanta Isabel de</i>	
BAO	<i>c. Solter</i> ..	583		<i>Borbon</i> ..	715
EAP	<i>c. Cabo de Palos</i> ..	582	EDJ	<i>b. Santa Isabel</i> ..	717
EAS	<i>c. Cabo Mayor</i> ..	582	EDK	<i>b. Reina Maria Cristina</i>	717
EAT	<i>c. Teneriffe</i> ..	535	EDL	<i>b. Antonio Lopez</i> ..	711

		PAGE			PAGE
EDM	b. Manuel Calvo ..	715	EGB	c. Melilla ..	567
EDN	b. Montserrat ..	716	EGC	c. Madrid EGC ..	583
EDO	b. Leon XIII ..	715	EGD	c. Ceuta ..	567
EDP	b. Isla Depanay ..	715	EGE	c. Barcelona EGE ..	582
EDQ	b. San Carlos ..	717	EGF	c. Larache ..	567
EDR	b. Florinda ..	714	EGG	c. Valencia ..	583
EDS	b. P. Satrustegui ..	717	EGH	c. Bilbao ..	582
EDT	b. Alfonso XIII EDT ..	711	EGI	c. Mahon ..	583
EDU	b. Reina Victoria ..		EGJ	c. Coruña ..	582
	Eugenia ..	717	EGK	c. Tetuan ..	567
EDV	b. Montevideo EDV ..	716	EGM	c. Malaga ..	583
EDW	b. M. L. Villaverde ..	716	EGZ	c. Guadalajara ..	582
EDX	b. Juliana ..	715	EHA	b. Torpedero No. 1 ..	718
EDY	b. Navarra EDY ..	716	EHB	b. Torpedero No. 2 ..	718
EDZ	b. Ciudad de Cadiz ..	713	EHC	b. Torpedero No. 3 ..	718
EEA	b. Auxias March ..	712	EHD	b. Torpedero No. 4 ..	718
EEB	b. Barcelo ..	712	EHE	b. Torpedero No. 5 ..	718
EEC	b. Cabañal ..	712	EHF	b. Torpedero No. 6 ..	718
EED	b. Andalucia ..	711	EHG	b. Torpedero No. 7 ..	718
EEE	b. Torras y Bages ..	718	EHH	b. Torpedero No. 8 ..	718
EEF	b. Vicente Ferrer ..	719	EHI	b. Torpedero No. 9 ..	718
EEG	b. Grao ..	714	EHJ	b. Torpedero No. 10 ..	718
EEH	b. J. B. Llevera ..	715	EHK	b. Torpedero No. 11 ..	718
EEI	b. Jatiba ..	715	EHL	b. Torpedero No. 12 ..	718
EEJ	b. Jorge Juan ..	715	EHM	b. Torpedero No. 13 ..	718
EEK	b. Canalejas ..	713	EHN	b. Torpedero No. 14 ..	718
EEL	b. A. Lazaro ..	711	EHO	b. Osado ..	717
EEM	b. Aragon ..	711	EHP	b. Isaac Peral ..	715
EEN	b. General Fernandez ..		EHQ	b. Audaz ..	712
	Silvestre ..	714	EHR	b. Proserpina ..	717
EEO	b. Sagunto ..	717	EHS	b. Terror ..	718
EEP	b. V. Puchol ..	719	EHT	b. Hernan Cortes ..	714
EEQ	b. Castilla ..	713	EHU	b. Marques de Molins ..	716
EER	b. Vicente La Roda ..	719	EHV	b. Marques de la ..	
EES	b. J. S. Sister ..	715		Victoria ..	716
EET	b. Teodoro Llorente ..	718	EHW	b. Marie de Molina ..	716
EEU	b. Cataluna EEU ..	713	EHX	b. Submarino A. 1 ..	717
EEV	b. Jacinto Verdaguer ..	715	EHY	b. Submarino A. 2 ..	717
EEW	b. Villarreal EEW ..	719	EHZ	b. Submarino A. 3 ..	717
EEX	b. Navarra EEX ..	716	EIA	b. War Yukon ..	811
EEY	b. Adolfo ..	711	EIE	b. Hampstead Heath ..	762
EEZ	b. Tambre ..	718	EIF	b. Discoverer ..	751
EFA	b. Atlante EFA ..	712	EIG	b. Merchant ..	778
EFB	b. Beliver ..	712	EIH	b. Navigator ..	781
EFC	b. Cataluña EFC ..	713	EII	b. City of Smyrna ..	741
EFD	b. Delfin EFD ..	713	EIJ	b. Loch Lomond ..	772
EFE	b. Teresa Pamies ..	718	EIK	b. Crewe Hall ..	749
EFF	b. Salvador EFF ..	717	EIL	b. Crosby Hall ..	749
EFG	b. Mar Caspio ..	715	EIM	b. War Nootka ..	810
EFH	b. Hesperides ..	714	EIO	b. Arbecco ..	729
EFI	b. Isleno ..	715	EIP	b. Warkworth ..	809
EFJ	b. Rey Jaime I ..	717	EIR	b. Port Hacking ..	789
EFK	b. Mallorca ..	715	EIS	b. Clan Morrison ..	745
EFL	b. Lulio ..	715	EIT	b. Clan Monroe ..	745
EFM	b. Tangoreño ..	718	EIU	b. Clan Ranald ..	746
EFN	b. Mahon ..	715	EIV	b. Inverness ..	766
EFO	b. Isla de Menorca ..	715	EIZ	b. Dean Swift ..	750
EFP	b. Torre Blanca ..	718	EJB	b. Mallard ..	774
EFQ	b. Menorquin ..	716	EJC	b. Woodcock ..	812
EFR	b. Balear ..	712	EJD	b. Polish Monarch ..	788
EFS	b. Rey Jaime II ..	717	EJE	b. Benavon ..	733
EFT	b. Monte Toro ..	716	EJF	b. Queensland ..	791
EFU	b. Turia ..	719	EJG	b. Aguila ..	726
EFV	b. Reina Victoria ..	717	EJH	b. Cressington Court ..	748
EFW	b. Villa Garci ..	719	EJI	b. Dundrennan ..	751
EFX	b. Tirso EFX ..	718	EJJ	b. Hyanthes ..	765
EFY	b. Fuerteventura ..	714	EJN	b. Mercedes de Larri- naga ..	778
EFZ	b. Jaume d'Urgell ..	715		b. Tern ..	803
EGA	c. Almeria ..	582	EJP		

		PAGE			PAGE
EJO	b. Glasgow	758	ENJ	b. Maid of Orleans ..	774
EJR	b. Anselma de Larri- naga	728	ENK	b. Jersey Moor	767
EJT	b. Navasota	781	ENL	b. Wairuna	808
EJV	b. Sudbury	800	ENM	b. Trinculo	805
EJW	b. Port Chalmers ..	789	ENN	b. Andreó	727
EJY	b. Volute	807	ENP	b. Llanthony Abbey ..	772
EJZ	b. Collingham	747	ENQ	b. Nowshera	783
EKA	b. Silversand	798	ENR	b. Gleneden	759
EKC	b. Benrines	734	ENS	b. Benalder	733
EKD	b. Spilsby	799	ENT	b. Levenpool	771
EKE	b. War Cariboo	808	ENV	b. Glensanda	759
EKF	b. Carisbrook	739	ENV	b. Hurstside	765
EKG	b. Fife	756	ENW	b. Logician	772
EKH	b. Southport	799	ENX	b. Fenchurch	755
EKI	b. Wearbridge	811	EOA	b. Gladstone	758
EKM	b. Mahronda	774	EOB	b. Clematis	747
EKN	b. Nigaristan	782	EOC	b. Tafna EOC	801
EKN	b. Portloe	789	EOE	b. City of Baroda ..	741
EKO	b. Marlwood	776	EOG	b. Nevisian	781
EKR	b. Salient	795	EOJ	b. Dalraza	740
EKT	b. Warfield	809	EOJ	b. Sitra	798
EKV	b. Cliftonhall	747	EOI	b. Arabier	728
EKW	b. Manchester Brigade	774	EON	b. Cimbrier	741
EKY	b. Kurmark	770	EOO	b. Fxmouth	758
ELA	b. Gloria de Larrinaga	759	EOP	b. Maindy Abbey ..	774
ELF	b. Iddesleigh	765	EOQ	b. Neko	781
ELH	b. Garryvale	757	EOR	b. Stanley Hall	799
ELI	b. Concordia	747	EOS	b. David Lloyd George	750
ELJ	b. August Belmont ..	730	EOT	b. Baron Kelvin	732
ELM	b. Novington	783	EOU	b. Inveresk	766
ELN	b. Queen Alexandra ..	791	EOV	b. Mesaba	778
ELQ	b. Dungeness	752	EOW	b. Hellenes	763
ELR	b. Tregurno	804	EOX	b. Hostilius	764
EIS	b. Langton Hall	771	EOZ	b. Needwood	781
ELT	b. Severnmede	797	EPA	b. E. O. Saltmarsh ..	754
ELU	b. Flinton	756	EPB	b. Maindy Manor ..	774
ELV	b. Burnholme	737	EPC	b. Maindy Court	774
ELW	b. Saxilby	796	EPD	b. Flying Breeze	756
ELY	b. Hebburn	763	EPE	b. Rothley	794
ELZ	b. Manchester Division	775	EPF	b. Grelstone	761
EMA	b. Marie de Larrinaga	776	EPG	b. Kirkwood	769
EMB	b. Asuncion de Larri- naga	730	EPH	b. Jolly Inez	767
EMC	b. Esperanza de Larri- naga	754	EPJ	b. Onwen	784
EMF	b. Victoria de Larri- naga	807	EPJ	b. Rumney	795
EMG	b. Asturian	730	EPK	b. Vineleaf	807
EMH	b. Austrian	731	EPL	b. Somerset	799
EMJ	b. Lucigen	773	EPN	b. Senator	797
EMK	b. Falernian	755	EPO	b. Port Augusta	789
EML	b. Malatian	774	EPQ	b. Port Philip	789
EMM	b. City of Shanghai ..	741	EPQ	b. Benvenue	734
EMN	b. Maronian	776	EPQ	b. Benvenue	734
EMO	b. Montenegro EMQ	779	EPW	b. Statesman	799
EMS	b. Professor EMS	791	EPW	b. Cottesmore	748
EMT	b. Thessaly	803	EPY	b. Inveric	766
EMV	b. Wye Crag	813	EPZ	b. Gymeric	761
EMZ	b. Tintah	802	EQB	b. Port Alma	789
ENA	b. Valverde	806	EQC	b. Roseleaf	794
ENA	b. Vasconia	807	EQD	b. Port Victor	790
ENC	b. Rocio	793	EQE	b. Cape Breton	738
END	b. Hermione END	763	EQF	b. Aspenleaf	730
ENE	b. Governor	760	EQH	b. Wigmore	812
ENF	b. Bankdale	731	EQI	b. Clan Kennedy	743
ENG	b. War Down	809	EQJ	b. Trostan	805
ENH	b. Lompoc	772	EQK	b. Gwladys	761
ENI	b. Kent	769	EQL	b. Queenmoor	791
			EQN	b. Sampan	795
			EQO	b. Baysarua	733
			EQP	b. Megna	777
			EQQ	b. Staveley	799
			EQR	b. Glenstrae	759

		PAGE			PAGE
EQV	b. Rapidan ..	792	EUZ	b. Zermatt ..	813
EQY	b. Rotenfels ..	794	EVA	b. Mesopotamia ..	778
ERB	b. Leeds City ..	771	EVB	b. Queen Maud ..	791
ERC	b. York Castle ..	813	EVC	b. Rabymer ..	791
ERE	b. Corfe Castle ..	748	EVD	b. River Orontes ..	793
ERF	b. Sabine ..	795	EVF	b. Umzumbi ..	806
ERG	b. Susquehanna ..	800	EVG	b. Willesden ..	812
ERH	b. Epsom ..	754	EVH	b. Izaston ..	767
ERI	b. Umtali ..	806	EVJ	b. Corwen ..	748
ERK	b. Tusculum ..	805	EVK	b. Granmore ..	748
ERL	b. Assiout ..	730	EVL	b. Hartfield ..	762
ERM	b. Thermidor ..	803	EVN	b. Queen Elizabeth ..	791
ERR	b. War Breeze ..	808	EVP	b. Halizones ..	761
ERS	b. Scottish Monarch ..	796	EVU	b. Stanmore ..	799
ERU	b. Wearpool ..	811	EVV	b. Euplectela ..	755
ERV	b. Framlington Court ..	756	EVW	b. Physa ..	787
ERW	b. Prah ..	790	EVY	b. Atholl ..	730
ERY	b. Vancouver ..	806	EVZ	b. S. Stephen ..	801
ERZ	b. Erroll ..	754	EWC	b. Perth ..	787
ESA	b. Makalla ..	774	EWD	b. Cape Corso ..	738
ESC	b. Malayan ..	611	EWE	b. Wimborne ..	812
ESC	b. Malayan ..	774	EWF	b. Clarissa Radcliffe ..	747
ESD	b. Devon City ..	750	EWG	b. Palm Branch ..	785
ESE	b. Brodsworth ..	737	EWK	b. Datchet ..	750
ESF	b. Chalister ..	740	EWK	b. Cambrian King ..	738
ESH	b. Gambia ..	757	EWN	b. Tabarka ..	801
ESJ	b. Accra ..	725	EWK	b. Pengreep ..	786
ESK	b. Ashanti ..	730	EWS	b. Twickenham ..	805
ESO	b. Sicily ..	797	EWU	b. Beckenham ..	733
ESP	b. Baytigers ..	733	EWV	b. Blackheath ..	735
ESQ	b. Kalimba ..	768	EWZ	b. Cairngowan ..	737
ESR	b. Janeta ..	767	EXB	b. Norwich City ..	783
ESS	b. Brescia ESS ..	736	EXC	b. Harperley ..	762
EST	b. Phrygia ..	787	EXE	b. Maylands ..	777
ESV	b. Blakemoor ..	735	EXF	b. Llangorse ..	772
ESW	b. Roma ESW ..	793	EXG	b. Duneric ..	752
ESY	b. Bellerby ..	733	EXI	b. Scaldier ..	796
ESZ	b. Diyatalawa ..	751	EXJ	b. Sorrento ..	799
ETB	b. Director ..	751	EXK	b. Reading ..	792
ETC	b. Oak Branch ..	783	EXN	b. Antonio EXN ..	728
ETF	b. Lamington ..	771	EXN	b. Auguste Halenke ..	730
ETG	b. Hortensius ..	764	EXO	b. Ioanna ..	766
ETJ	b. Skipton Castle ..	798	EXP	b. Bretanier ..	736
ETK	b. Kepwickhall ..	769	EXR	b. Ocean Monarch ..	784
ETL	b. Troutpool ..	805	EXS	b. Copenhagen ..	747
ETM	b. Stagpool ..	799	EXT	b. Corstar ..	748
ETP	b. County of Cardigan ..	748	EXU	b. Skegness ..	798
ETQ	b. North Britain ..	783	EXW	b. Cardiff ..	738
ETS	b. Freshwater ..	757	EXX	b. Broadmayne ..	737
ETT	b. Camerata ..	738	EXY	b. Penrhydd ..	787
ETU	b. Baydouglass ..	732	EXY	b. Trojan ..	805
ETV	b. Manchurian Prince ..	775	EYA	b. Briarleaf ..	736
ETY	b. Atlantic City ..	730	EYB	b. Mapleleaf ..	775
ETZ	b. Petersham ..	787	EYC	b. Laurelleaf ..	771
EUA	b. Antigone EUA ..	728	EYD	b. Birchleaf ..	735
EUB	b. War Pyramid ..	810	EYE	b. Tuscarora ..	805
EUD	b. Westcliff ..	811	EYF	b. Cadillac ..	737
EUE	b. Headcliffe ..	763	EYG	b. Saranac ..	795
EUH	b. Zero ..	813	EYH	b. Spermina ..	799
EUI	b. Zuleika ..	813	EYI	b. Vennonia ..	807
EUM	b. Brabandier ..	735	EYJ	b. Tiara ..	803
EUN	b. Geddingtion Court ..	757	EYK	b. Crown of Castile ..	749
EUQ	b. Apsley ..	728	EYL	b. Crown of Galicia ..	749
EUQ	b. Don Caesar ..	751	EYM	b. British Peer ..	736
EUR	b. Salerno ..	795	EYN	b. British Knight ..	736
EUS	b. Ariadne Irene ..	729	EYO	b. Coq EYO (Le) ..	771
EUT	b. Ariadne Christine ..	729	EYP	b. Luciline ..	773
EUU	b. Pruth ..	791	EYQ	b. Lutetian ..	773
EUW	b. Queen Louise ..	791	EYR	b. Horden ..	764

		PAGE			PAGE
EYS	b. British Earl ..	736	FCJ	b. Amiral Jauréguiberry ..	630
EYT	b. British Viscount ..	736	FCX	b. Amiral Nielly ..	630
EYU	b. British Baron ..	736	FCY	b. Amiral Ponty ..	630
EYV	b. Cape Colony ..	738	FDA	c. Dakar ..	552
EYW	b. British Marquis ..	736	FDB	b. La Coubre ..	636
EYX	b. Tynemouth ..	805	FDD	b. Monte d'Oro ..	643
EYY	b. British Duke ..	736	FDE	b. Colonel Driant ..	636
EYZ	b. Magician ..	773	FDF	c. France FDF ..	639
EZA	b. Duncutha ..	751	FDG	c. Diégo-Suarez ..	564
EZE	b. Frenleaf ..	756	FDH	b. Rochebonne ..	646
EZF	b. Elmleaf ..	753	FDN	b. France FDN ..	639
EZG	b. Beechleaf ..	733	FDO	c. Dzaoudzi ..	541
EZH	b. Bayleaf ..	733	FDO	b. Mont Joie ..	643
EZJ	b. Hollyleaf ..	764	FDP	b. Phocéen ..	645
EZK	b. Dockleaf ..	751	FDR	b. Colmar ..	636
EZL	b. Viper ..	807	FDS	b. Shamrock FDS ..	647
EZM	b. Lindenhall ..	771	FDT	b. Outreau ..	644
EZN	b. Biarritz ..	734	FDU	b. Saverne ..	647
EZO	b. Mount Snowdon ..	780	FDV	b. Ribeauville ..	646
EZQ	b. Regent ..	792	FDZ	b. Craonne II ..	636
EZR	b. Aberlour ..	725	FEB	c. Bernières-Gonio ..	548
EZS	b. Medomsley ..	777	FEC	c. Capucins-Gonio ..	548
EZT	b. Hampstead ..	762	FEG	c. Guipavas-Gonio ..	549
EZW	b. Whateley Hall ..	811	FEJ	c. Djidjelli-Gonio ..	522
EZX	b. Barmoor ..	731	FER	c. Pointe du Raz-Gonio ..	549
EZY	b. Eaton Hall ..	752	FES	c. Soubise-Gonio ..	549
F4	c. Frankfort-on-Oder ..	553	FET	c. Tréguier S. Gonery-Gonio ..	549
FD	c. Friedrichshafen ..	553	FEU	c. Barre de L'Adour-Gonio ..	548
FL	c. Eiffel Tower, Paris ..	548	FEZ	c. S. Nazaire-Chemoulin-Gonio ..	549
FM	c. Frankfort-on-Maine ..	553	FFA	c. Alger T.S.F. ..	522
FAA	b. Aquitaine ..	631	FFB	c. Boulogne-sur-Mer T.S.F. ..	548
FAC	b. Carmen FAC ..	635	FFC	c. Bonifacio T.S.F. ..	548
FAG	b. Grandlieu ..	639	FFC	c. Cherbourg ..	548
FAJ	b. S. Tropez ..	648	FFH	c. Havre T.S.F. (Le) ..	549
FAK	b. Elisabeth Marie ..	637	FFI	c. Dieppe ..	548
FAM	b. Jeanne Marie ..	641	FFM	c. Marseille-Gonio ..	549
FAO	c. Hanof ..	550	FFM	c. Marseille T.S.F. ..	549
FAP	b. Provence FAP ..	645	FFN	c. Nice T.S.F. ..	549
FAR	b. La Loire ..	641	FFS	c. S. Maries-de-la-Mer T.S.F. ..	549
FAS	b. S. Raphaël ..	648	FFT	c. Cap-Bon ..	585
FAU	b. Divatte ..	637	FFU	c. Ouessant-Gonio ..	549
FAV	b. Limoges ..	641	FFU	c. Ouessant T.S.F. ..	549
FAY	b. Yser FAY ..	651	FFX	c. Bordeaux T.S.F. ..	548
FBB	b. Cap Fagnet ..	635	FFZ	c. Shanghai-Zikawei ..	540
FBC	b. Normandie ..	644	FGA	b. Biskra ..	632
FBD	b. Simon Duhamel ..	647	FGB	b. Ville de Bone ..	650
FBG	b. Agile ..	630	FGC	b. Cantal ..	635
FBG	b. Lavardin ..	641	FGC	c. Corfou Potamo ..	555
FBH	b. Marne FBH ..	642			
FBL	b. Baleines (Les) ..	632			
FBM	b. Marguerite Marie II ..	642			
FBN	b. Chassiron ..	635			
FBO	b. Marguerite Marie ..	642			
FBS	b. Ghislaine ..	630			
FBT	b. Doucouëdic FBT ..	637			
FBX	b. Bisson FBX ..	632			
FCA	b. Asie FCA ..	631			
FCA	c. Saigon ..	551			
FCB	b. Bougainville ..	632			
FCC	b. Ceylan ..	635			
FCD	b. Duplex FCD ..	627			
FCE	b. Amiral Duperre ..	630			
FCF	b. Amiral Fourichon ..	630			
FCG	b. Amiral Rigault de Genouilly ..	630			
FCH	b. Amiral Ganteaume ..	630			
FCI	b. Amiral Latouche Treville ..	630			

		PAGE			PAGE
FGD	b. Duc d'Aumale ..	637	FJC	b. Canada FJC ..	635
FGE	b. La Fayette ..	641	FJG	b. Britannia FJG ..	633
FGF	b. Flandre FGF ..	638	FJI	b. Gergovia ..	639
FGG	b. Duc de Bragançe ..	637	FJL	b. Liberia ..	641
FGI	b. Mississippi ..	643	FJM	b. Madonna ..	642
FGJ	b. S. Jean ..	647	FJP	b. Patria FJP ..	644
FGK	b. Abd-el-Kader ..	629	FJR	b. Roma FJR ..	646
FGL	b. Ville de Nantes ..	650	FJV	b. Venezia ..	650
FGM	b. Ville de Madrid ..	650	FKA	c. Kien-An ..	550
FGN	b. La Nièvre ..	643	FKB	b. Sybil ..	647
FGO	c. Loango ..	550	FKD	b. Bordeaux ..	632
FGO	b. Timgad ..	648	FKD	c. Destrellan ..	556
FGP	b. Eugène Péreire ..	638	FKF	c. Duala ..	550
FGQ	b. Oudjda ..	644	FKG	b. Guéthary ..	639
FGR	b. Charles Roux ..	635	FKH	b. Homécourt ..	640
FGS	b. Moïse ..	643	FKI	b. Irouléguy ..	640
FGT	b. Ville de Tunis ..	651	FKQ	c. Fort de France ..	565
FGU	b. Puerto-Rico ..	645	FKN	b. Flandre FKN ..	638
FGV	b. Aube ..	631	FKY	b. Hendaye ..	640
FGW	b. Vendée ..	650	FKY	c. Cayenne ..	550
FGX	b. Gard I ..	639	FLA	b. Ville de Havre ..	650
FGY	b. Maréchal Bugeaud ..	642	FLD	b. Conde FLD ..	636
FGZ	b. Ville d'Oran FGZ ..	651	FLG	b. Eugène Grosos ..	638
FHA	b. Afrique II ..	630	FLH	b. Havraise ..	610
FHA	c. Brest-Guipavas ..	548	FLI	b. Ville de Majunga ..	650
FHB	b. Notre Dame de Lourds ..	644	FLJ	b. Ville d'Alger ..	650
FHC	b. Charlotte ..	635	FLK	b. Anglet ..	631
FHD	b. Nord Capper ..	644	FLL	b. Ville de Rouen ..	651
FHE	b. Emmanuella ..	637	FLM	b. Ville de Reims ..	651
FHF	b. France FHF ..	639	FLN	b. Ile de la Reunion ..	640
FHG	b. Gabriella ..	639	FLO	b. Ville d'Oran FLO ..	651
FHH	b. Henriette FHH ..	640	FLP	b. Ville de Paris ..	651
FHI	b. Asie FHI ..	631	FLQ	b. Ville de Tamatave ..	651
FHI	b. Jeannot ..	641	FLR	b. Ville d'Arras ..	650
FHK	b. Slack ..	647	FLS	b. Ville de Marseille ..	650
FHL	b. Edith Cavell FHL ..	637	FLT	c. Tourane ..	551
FHM	b. Marie Rose FHM ..	642	FLT	c. Djibouti ..	551
FHN	b. L'Europe FHN ..	638	FLY	c. Mutsamuda ..	541
FHO	b. Antoinette ..	631	FMA	c. Monrovia ..	654
FHP	b. Lillois ..	641	FMB	b. Armand Béhic ..	631
FHQ	b. Rorqual ..	646	FMC	b. Chili ..	635
FHR	b. Rosemonde ..	646	FME	b. Equateur ..	637
FHS	b. Marie-Stella ..	642	FMF	b. Capitaine Faure ..	635
FHT	b. Somme FHT ..	647	FMH	b. Athos ..	631
FHU	b. Automne ..	631	FMI	b. Meïnam ..	642
FHW	b. Wimerieux ..	651	FMK	b. Crimée ..	636
FHX	b. Amérique ..	630	FML	b. Lotus ..	641
FHY	b. Rosita ..	646	FMM	b. Normand ..	644
FHY	c. Ouessant-Pen-ar- Roch ..	549	FMN	b. Natal FMN ..	643
FHZ	b. Inès FHZ ..	640	FMO	b. Orenoque ..	644
FIA	b. Titan FIA ..	648	FMP	b. Pei Ho ..	645
FIB	b. Bosphore ..	632	FMR	b. Cordillère ..	636
FIC	b. Caucase ..	635	FMS	b. Porthos ..	645
FID	b. Danube FID ..	636	FMT	b. Atlantique ..	631
FIG	b. Kouang-Si ..	641	FMU	b. Basque ..	632
FIH	b. Ispahan ..	640	FMX	b. Oxus ..	644
FIK	b. Docteur P. Benoit ..	637	FMY	b. Bagdad FMY ..	632
FIM	b. Imérina ..	640	FMZ	b. Amazone ..	630
FIN	b. Breton ..	632	FND	b. Dumbea ..	637
FIO	c. Miquelon ..	579	FNE	b. Euphrate FNE ..	638
FIO	b. Sidon ..	647	FNG	b. Andre Lebon ..	631
FIS	b. Commandant Dorise ..	636	FNK	b. Kantara (El) ..	641
FIT	c. Galantry ..	579	FNL	b. Louqsor ..	642
FIX	b. Duplex FIX ..	637	FNM	b. Melbourne FNM ..	643
FIY	b. Lieutenant Missiessy ..	641	FNN	b. Nera ..	643
FJA	c. Majunga ..	564	FNO	b. Océanien ..	644
FJB	b. Providence FJB ..	645	FNP	b. Paul Lecat ..	645
			FNS	b. Saghalien ..	646
			FNV	b. Persepolis ..	645

PAGE			PAGE
644	FRJ	b. Jacques Fraissinet ..	641
647	FRK	b. Bourges ..	632
548	FRL	b. Apollon ..	631
647	FRN	b. Numidia ..	644
648	FRO	b. Blois ..	632
647	FRP	b. Pelion ..	645
648	FRQ	b. Toulouse ..	649
639	FRR	b. Louis Fraissinet ..	642
648	FRS	b. Edouard Shaki ..	637
648	FRT	b. Corte II ..	636
647	FRU	c. Rufisque ..	552
648	FRV	b. Vulcain ..	651
551	FRW	b. Orléans FRW ..	644
647	FRX	b. Nantes ..	643
648	FRY	b. S. Anne ..	647
648	FRZ	b. S. Nazaire ..	648
647	FSA	b. Aurigny ..	631
631	FSB	b. Bretagne FSB ..	632
629	FSC	b. Gascogne ..	639
635	FSD	b. Divonna ..	637
637	FSE	b. D'Entrecasteux ..	636
552	FSF	b. Forniose ..	638
645	FSG	b. Garonna ..	639
645	FSH	b. Dahomey ..	636
641	FSI	b. Belle Isle ..	632
647	FSL	b. Liger ..	641
650	FSM	b. Samara ..	646
640	FSN	b. Fort de Troyon ..	638
643	FSO	b. Baoulé ..	632
550	FSP	b. Champlain FSP ..	635
631	FSR	c. El Fasher ..	583
631	FSS	b. Fort de Souville ..	638
648	FST	b. Lutetia ..	642
647	FSU	b. Fort de Douamont ..	638
643	FSV	b. Fort de Vaux ..	639
644	FTA	c. Tabou ..	552
637	FTB	b. Niagara FTB ..	643
631	FTC	b. Caravelle ..	635
647	FTD	b. La Pérouse ..	641
635	FTE	b. Espagne FTE ..	638
637	FTF	b. S. Louis FTF ..	648
632	FTG	b. Garonne FTG ..	639
638	FTH	b. Hudson ..	640
639	FTI	b. Chicago FTI ..	635
646	FTJ	b. Jaques Cartier ..	641
648	FTK	b. Californie ..	635
641	FTL	b. Lorraine (La) FTL ..	641
641	FTM	b. Martinique ..	642
643	FTN	b. Navarre ..	643
551	FTO	b. Caroline FTO ..	635
644	FTP	b. Pérou ..	645
647	FTQ	b. S. Servan ..	648
644	FTR	b. Rochambeau ..	646
647	FTS	b. Savoie FTS ..	647
648	FTT	b. Touraine ..	649
631	FTU	b. Honduras ..	640
650	FTV	b. Virginie ..	651
647	FTW	b. Venezuela FTW ..	650
631	FTX	b. Mexico FTX ..	643
639	FTZ	b. France FTZ ..	639
648	FUA	c. Ben Negro-Gonio ..	585
641	FUA	c. Bizerte ..	585
640	FUC	c. Cherbourg-Rouges- Terres ..	548
636	FUD	c. Dunkerque Castlenau ..	548
637	FUE	c. Mengam ..	549
648	FUE	c. Mengam ..	549
631	FUH	c. Chemolin ..	548
640	FUI	c. Ajaccio-Aspretto ..	548
649	FUK	c. Oran Ain el Turck ..	522

		PAGE			PAGE
FUL	c. Calais ..	548	FYD	b. Notre Dame des	
FUN	c. Lorient-Pen-Mané ..	549		Dunes ..	644
FUQ	c. Porquerolles ..	549	FYD	b. Labrador FYD ..	641
FUR	c. Rochefort-sur-Mer ..	549	FYE	b. Notre Dame d'Es-	
FUT	c. Toulon-Mourillon ..	549		pérance ..	644
FUW	c. Barre de L'Adour ..	548	FYF	b. Ville de Cette ..	650
FUX	c. Toulon Croix des		FYG	b. Algérie ..	630
	Signaux ..	549	FYH	b. Carol I ..	635
FUX	c. Toulon-Gonio ..	549	FYI	b. Ariadne ..	631
FVA	b. Savoie FVA ..	647	FYJ	b. Sierentz ..	647
FVB	b. Sidi-Brahim ..	647	FYK	b. Nicholas Toussaint	643
FVC	b. Mont-Cenis ..	643	FYL	b. Leopold L.D. ..	641
FVD	b. Flandre FVD ..	638	FYM	b. Maroc ..	642
FVE	b. Espagne FVE ..	638	FYN	b. Emilie L.D. ..	637
FVF	b. Formosa FVF ..	638	FYO	b. Océan FYO ..	644
FVG	b. Portugal FVG ..	645	FYP	b. Apache FYP ..	631
FVH	b. Sidi-Abdullah ..	647	FYQ	b. Président-Le-Roy-	
FVI	b. Ile de France ..	640		Lallier ..	645
FVJ	b. Vladiva ..	650	FYR	b. Nicholas Norbert ..	643
FVK	b. Alsace ..	630	FYS	b. Eros FYS ..	637
FVL	b. Plata FVL ..	645	FYT	b. Mauritanie ..	643
FVM	b. Maine FVM ..	642	FYU	b. Resolue ..	646
FVN	b. Nivernais ..	644	FYV	b. Notre Dame des	
FVS	b. Salta ..	646		Dames ..	644
FVT	b. Rigel ..	646	FYV	b. Véga FYV ..	650
FVV	b. Mont-Cervin ..	643	FWW	b. Savoie FWV ..	647
FWW	b. Italie FWV ..	641	FWX	b. Gaulois ..	639
FWX	b. Mont Pelvux ..	643	FYY	b. La Manche ..	642
FWA	c. Quang-Tchéou-		FYZ	b. Suzanne et Marie	
	Wan ..	540		FYZ ..	647
FWC	b. Corneille ..	636	FZA	b. La France FZA ..	639
FWD	b. Magny ..	642	FZC	b. Brest ..	632
FWE	b. S. Eloi ..	647	FZE	b. Angers ..	631
FWF	b. Shouragallus ..	647	FZG	b. Bordeaux FZG ..	632
FWG	b. Gafsa ..	639	FZH	b. Newhaven FZH ..	643
FWH	b. Hadrumète ..	639	FZI	b. Portiers ..	645
FWI	b. Alumine ..	630	FZJ	b. Edouard Jéramec ..	637
FWJ	b. Jade ..	641	FZK	b. Emile Baudot ..	637
FWK	b. Frank Delmas ..	639	FZM	b. Notre Dame de la	
FWL	b. Lapeyrouse ..	641		Mer ..	644
FWM	b. Miquelon ..	643	FZN	b. Nord ..	644
FWN	b. Pontetcanet ..	645	FZP	b. Pas de Calais ..	644
FWO	b. La Fontaine ..	641	FZR	b. Rouen FZR ..	646
FWP	b. Pomerol ..	645	FZS	b. S. Jehanne ..	647
FWQ	b. Quartz ..	645	FZT	b. Pouyer-quertier	645
FWR	b. Château Palmer ..	635	FZV	b. Tours FZV ..	649
FWS	b. Astrée FWS ..	631	FZY	b. Portsmouth FZY ..	645
FWI	b. Château Latour ..	635	FABE	b. Béthune ..	632
FWU	b. Utique ..	650	FABG	b. Gueydon ..	639
FWV	b. André Pierre ..	631	FABH	b. Bien-Hoa ..	632
FWW	b. Sephora Worms ..	647	FABI	b. C.24 ..	633
FWX	b. Margause ..	642	FABL	b. Belfort FABL ..	632
FWY	b. Hyppolite Worms ..	640	FABN	b. Balny ..	632
FWZ	b. Suzanne et Marie		FABO	b. Bellone ..	632
	FWZ ..	647	FABP	b. Provence FABP ..	645
FXB	b. Manouba ..	642	FABR	b. Bout-Dehors ..	632
FXF	b. Felix-Touache ..	638	FABW	b. Torpilleur 342 ..	649
FXG	b. Tavignano ..	648	FABY	b. O'Byrne ..	644
FXH	b. Rhone FXH ..	646	FABZ	b. C.27 ..	633
FXL	b. Graviile ..	639	FACD	b. Diderot ..	637
FXM	b. Mustapha II ..	643	FACE	b. Centaure ..	635
FXN	b. Radioleine ..	645	FACH	b. Chamois ..	635
FXR	b. Marsa (La) ..	642	FACI	b. Clématite ..	635
FXT	b. Tafna FXT ..	648	FACJ	b. C.31 ..	633
FXY	b. Moulouya ..	643	FACL	b. Clorinde ..	635
FXZ	b. Mansoura ..	642	FACM	b. Clameur ..	635
FYA	b. Atmah ..	631	FACO	b. Courbet ..	636
FYB	b. Bacchante ..	631	FACP	b. Paul-Chailley ..	644
FYC	b. Cambrai ..	635	FACQ	b. Coq FACQ ..	636

PAGE			PAGE
635	FALD	b. Aldébaran ..	630
629	FALE	b. Eparges (Les) ..	637
633	FALG	b. Lagrange ..	641
636	FALI	b. Liévin ..	641
636	FALK	b. C.53 ..	633
637	FALN	b. Lorraine FALN ..	641
634	FALP	b. Laplace FALP ..	641
637	FALR	b. Rhône FALR ..	646
642	FALT	b. Tourville ..	649
637	FALU	b. Lunéville ..	642
637	FALX	b. Fouguese ..	639
637	FAMC	b. Charrue ..	635
631	FAMH	b. Torpilleur 332 ..	649
633	FAMI	b. Amiens ..	330
639	FAMJ	b. Jeanne d'Arc FAMJ ..	641
633	FAML	b. Lutteur ..	642
638	FAMN	b. Mastodonte ..	643
630	FAMO	b. Mohican ..	643
639	FAMP	b. Lamotte-Picquet ..	641
633	FAMR	b. Frimaire ..	639
641	FAMS	b. Shamrock FAMS ..	647
645	FAMT	b. Travailleur ..	649
643	FAMX	b. C.63 ..	634
639	FAMY	b. C.39 ..	633
644	FANC	b. Condorcet ..	636
639	FAND	b. Dordogne ..	637
648	FANI	b. Antigone FANI ..	631
639	FANM	b. Moufflon ..	643
633	FANS	b. Torpilleur 266 ..	648
639	FANT	b. Atalante ..	631
632	FANV	b. Vérité ..	605
635	FANW	b. C.80 ..	634
637	FAOB	b. Borée ..	632
639	FAOD	b. Dolphin FAOD ..	637
633	FAOM	b. Montgolfier ..	643
639	FAON	b. Craonne FAON ..	636
643	FAOP	b. Pigeon FAOP ..	645
640	FAOR	b. Fofait ..	638
645	FAOS	b. C.22 ..	633
637	FAOU	b. C.54 ..	633
640	FAOZ	b. C.81 ..	634
638	FAPC	b. Pierre-Callot ..	645
648	FAPE	b. Peronne ..	645
633	FAPG	b. Peau-Rouge ..	645
639	FAPH	b. Amphitrite ..	631
	FAPM	b. Marguerite VI ..	642
637	FAPN	b. Daphné FAPN ..	636
633	FAPO	b. Pothuau ..	645
647	FAPQ	b. C.1 FAPQ ..	633
651	FAPR	b. Primevère ..	645
634	FAPT	b. Du - Petit - Thouars ..	637
641	FAPU	b. Pluton ..	645
637	FAPW	b. C.7 ..	633
641	FAPY	b. Torpilleur 329 ..	649
640	FAQB	b. Bœuf ..	632
633	FAQC	b. Chêne ..	635
641	FAQE	b. Epinal ..	637
641	FAQL	b. Loiret ..	641
641	FAQM	b. Mauviette ..	643
641	FAQO	b. C.55 ..	633
638	FAQR	b. Quentin - Roosevelt ..	645
634	FAQT	b. Tourterelle ..	649
633	FAQU	b. C.26 ..	633
639	FAQV	b. Vergniaud ..	650
639	FAQX	b. Fourrageur ..	639
634	FAQZ	b. C.82 ..	634
646	FARB	b. Cerbère ..	635
634	FARH	b. Aurochs ..	631
630	FARI	b. Néréide ..	643

FARJ	b. C.41	633	FAXN	b. France FAXN ..	639
FARL	b. C.17	633	FAXQ	b. Elen	637
FARM	b. Roland-Morillot ..	646	FAXV	b. Fantastique ..	638
FARN	b. Ernest	637	FAYG	b. C.77	634
FARV	b. Brumaire	633	FAYJ	b. Jules-Ferry ..	641
FARV	b. Revigny	646	FAYL	b. Renée	646
FARW	b. Waldeck - Rousseau	651	FAYL	b. Torpilleur 312 ..	649
FARY	b. Faraday FARY ..	638	FAYP	b. Pintade	645
FARZ	b. Torpilleur 359 ..	649	FAYU	b. C.28	633
FASD	b. Cassard	635	FAYW	b. C.60	634
FASI	b. Simoun	647	FAZD	b. Torpilleur 336 ..	649
FASJ	b. C.2	633	FAZE	b. Escaut	638
FASM	b. Samson	646	FAZG	b. Torpilleur 362 ..	649
FASN	b. Sané	646	FAZH	b. C.62	634
FASO	b. Séminole FASO ..	647	FAZN	b. Narval	643
FASP	b. Paris FASP	644	FAZO	b. Romazotti ..	646
FASR	b. Astrée FASR	631	FAZS	b. C.25	633
FASY	b. C.45	633	FAZU	b. Zébu	631
FASZ	b. Torpilleur 278 ..	648	FAZV	b. l'ondeur	639
FATB	b. Trombe	649	FBAC	b. Baccarat FBAC ..	631
FATC	b. Coquelicot	636	FBAE	b. Arbalète	631
FATD	b. Torpilleur 299 ..	649	FBAG	b. Algérien	639
FATE	b. Démocratie	636	FBAI	b. Aïsne	639
FATG	b. Taillebourg	648	FBAK	b. C.46	633
FATH	b. Aréthuse	631	FBAL	b. C.78	634
FATI	b. C.57	634	FBAM	b. Annamite	631
FATL	b. Athlète FATL ..	631	FBAN	b. Annibal	631
FATO	b. Tourteau	649	FBAP	b. Apache FBAP ..	631
FATP	b. Antilope	631	FBAR	b. Ardent	631
FATR	b. Râteau	645	FBAT	b. Batailleuse ..	632
FATU	b. Thuya	648	FRAV	b. Aventurier	631
FATV	b. Volta	651	FBAX	b. l'aisan	638
FATY	b. Typhon	650	FBAY	b. Torpilleur 305 ..	649
FATZ	b. Tzar Nicolas II ..	650	FBCA	b. Calais	635
FAUC	b. Canard	635	FBCE	b. Érabie	637
FAUG	b. Guichen	639	FBCG	b. Courageuse	636
FAUI	b. Utile	650	FBCH	b. Champlain FBCH ..	635
FAUL	b. Euler	638	FBCL	b. Torpilleur 250 ..	648
FAUM	b. Michel et Renée ..	643	FBCM	b. Cimeterre	635
FAUN	b. C.44	633	FBCO	b. Colombe	636
FAUO	b. Fulton FAUO ..	639	FBCQ	b. Casque	635
FAUR	b. Curie	636	FBCR	b. Caroubier	646
FAUX	b. C.61	634	FBCS	b. Sabre FBCS	635
FAUY	b. Dupuy-de-Lôme ..	637	FBCT	b. Coëtlogon	635
FAUZ	b. Torpilleur 350 ..	649	FBCV	b. Cavalier	636
FAVB	b. C.23	633	FBCY	b. Coucy	635
FAVC	b. Vauluse FAVC ..	650	FBCZ	b. Capricieuse ..	637
FAVG	b. Vague	650	FBCD	b. Du Chaffault ..	637
FAVH	b. Victor Hugo	650	FBDG	b. Dugay-Trouin ..	636
FAVI	b. Iskheul	640	FBDH	b. Dehorter	633
FAVK	b. Torpilleur 361 ..	649	FBDJ	b. C.37	637
FAVL	b. Vinh-Long	651	FBDK	b. Ducouëdic FBDK ..	637
FAVO	b. Lavoisier	641	FBDL	b. Diligente	636
FAVR	b. Le Verrier	641	FBDN	b. Dédaigneuse ..	634
FAVS	b. C.64	634	FBDQ	b. C.91	648
FAVW	b. Torpilleur 366 ..	649	FBDU	b. Torpilleur 263 ..	637
FAVX	b. Vigoureux	650	FBDV	b. Dubourdieu ..	637
FAVY	b. Torpilleur 296 ..	649	FBDY	b. Dumont d'Urville ..	649
FAWB	b. Brave	632	FBDZ	b. Torpilleur 297 ..	633
FAWG	b. Grès	639	FBEA	b. C.47	636
FAWM	b. Milon	643	FBEK	b. Conquerante ..	648
FAWO	b. C.35	633	FBEL	b. Torpilleur 274 ..	636
FAWR	b. Torpilleur 330 ..	649	FBEP	b. Commandant Lucas	638
FAWS	b. Torpilleur 360 ..	649	FBET	b. Espiègle FBEP ..	632
FAWT	b. Newton FAWT ..	643	FBEV	b. Bellatrix FBET ..	638
FAWY	b. Frêne	639	FBEW	b. Evillé	633
FAXD	b. Desaix	637	FBEY	b. C.29	637
FAXI	b. Infatigable	640	FBEZ	b. Enseigne-Henry ..	649
FAXL	b. C.65	634		b. Torpilleur 351 ..	649

FBGD	b. Décid	639
FBGH	b. Hérón	637
FBGI	b. Agile	638
FBGL	b. Algot	634
FBGM	b. Méhar	641
FBGN	b. Grani	646
FBGP	b. Polyp	649
FBGR	b. Gronc	645
FBGS	b. Gracie	633
FBGV	b. Glavio	634
FBGW	b. C.88	649
FBGZ	b. Torpil	638
FBHA	b. Hame	649
FBHC	b. Carqu	634
FBHD	b. C.32	643
FBHI	b. Henri	646
FBHM	b. Homa	633
FBHO	b. Hova	631
FBHP	b. Hippo	639
FBHR	b. Aspira	631
FBHT	b. Hétre	639
FBHU	b. Hussa	639
FBHW	b. Torpil	633
FBHY	b. Fraca	634
FBHZ	b. Incon	631
FBIC	b. Inca	631
FBID	b. C.89	631
FBIK	b. Cassio	631
FBIO	b. Pinso	631
FBIP	b. Bellig	631
FBJQ	b. Bissor	638
FBJS	b. Vauto	649
FBIV	b. Fanfa	635
FBIX	b. Cactu	637
FBJC	b. Eperr	636
FBJE	b. Impé	635
FBJI	b. Mécara	648
FBJL	b. Les	635
FBJR	b. Orange	636
FBJS	b. Sans	635
FBJU	b. C.70	635
FBJY	b. Joyeu	646
FBJZ	b. C.83	635
FBKH	b. Audat	635
FBKL	b. Sakal	636
FBKN	b. Flam	635
FBKN	b. Renat	637
FBKP	b. Tonk	636
FBKU	b. Poign	633
FBKX	b. Fauco	637
FBKY	b. Torpil	637
FBKZ	b. Kaby	636
FBLA	b. C.90	634
FBLC	b. Alerte	648
FBLD	b. Curier	637
FBLE	b. Bar-le	637
FBLG	b. Bélier	649
FBLK	b. Gélino	633
FBLN	b. Mame	636
FBLO	b. Lanta	648
FBLP	b. Lobél	638
FBLO	b. Lapér	632
FBLS	b. Lasso	638
FBLT	b. Altai	633
FBLU	b. Luro	637
FBLV	b. Loup	649
FBLY	b. C.87	649

		PAGE			PAGE
FBGD	<i>b. Décidée</i>	636	FBMA	<i>b. Antarès</i>	631
FBGH	<i>b. Héron II</i>	640	FBMD	<i>b. C.95</i>	634
FBGI	<i>b. Agile</i>	630	FBME	<i>b. Epieü</i>	637
FBGL	<i>b. Algol</i>	630	FBMG	<i>b. Mangini</i>	642
FBGM	<i>b. Méhari</i>	643	FBMH	<i>b. Mammouth</i>	642
FBGN	<i>b. Granit</i>	639	FBMI	<i>b. Montmirail</i>	643
FBGP	<i>b. Polyphème</i>	645	FBML	<i>b. Mistral</i>	643
FBGR	<i>b. Grondeur</i>	639	FBMO	<i>b. Mondement</i>	643
FBGS	<i>b. Gracieuse</i>	639	FBMR	<i>b. Bambara</i>	632
FBGV	<i>b. Glaive</i>	639	FBMU	<i>b. Massue</i>	643
FBGW	<i>b. C.88</i>	634	FBMV	<i>b. C.16</i>	633
FBGZ	<i>b. Torpilleur 307</i>	649	FBMW	<i>b. Torpilleur 314</i>	649
FBHA	<i>b. Hamelin</i>	640	FBMX	<i>b. C.36</i>	633
FBHC	<i>b. Carquois</i>	635	FBMY	<i>b. Torpilleur 357</i>	649
FBHD	<i>b. C.32</i>	633	FBMZ	<i>b. C.76</i>	634
FBHI	<i>b. Henriette FBHI</i>	640	FBNA	<i>b. Nancy</i>	643
FBHM	<i>b. Homard</i>	640	FBNC	<i>b. Ancre</i>	631
FBHO	<i>b. Hova</i>	640	FBNH	<i>b. C.66</i>	634
FBHP	<i>b. Hippopotame</i>	640	FBNI	<i>b. Fanion</i>	638
FBHR	<i>b. Aspirant-Herber</i>	631	FBNL	<i>b. Torpilleur 269</i>	648
FBHT	<i>b. Hêtre</i>	640	FBNM	<i>b. Mortier</i>	643
FBHU	<i>b. Hussard</i>	640	FBNP	<i>b. Prado</i>	645
FBHW	<i>b. Torpilleur 302</i>	648	FBNS	<i>b. Torpilleur 337</i>	640
FBHY	<i>b. Torpilleur 352</i>	649	FBNT	<i>b. Engageante</i>	637
FBHZ	<i>b. Fracas</i>	639	FBNV	<i>b. Vacarme</i>	650
FBIC	<i>b. Inconstant FBIC</i>	640	FBNW	<i>b. C.38</i>	633
FBID	<i>b. C.89</i>	634	FBNX	<i>b. Torpilleur 365</i>	649
FBIK	<i>b. Inca FBIK</i>	640	FBOC	<i>b. Marocain</i>	642
FBIO	<i>b. Cassiopée</i>	635	FBOD	<i>b. C. 68</i>	634
FBIP	<i>b. Pinson I</i>	645	FBOI	<i>b. Oise</i>	644
FBIQ	<i>b. Belliqueuse</i>	632	FBOK	<i>b. Torpilleur 327</i>	649
FBIS	<i>b. Bisson FBIS</i>	632	FBOL	<i>b. Loup</i>	642
FBIV	<i>b. Vautour</i>	650	FBOM	<i>b. Somali FBOM</i>	647
FBIX	<i>b. Fanfare</i>	638	FBON	<i>b. Bouffonne</i>	632
FBJC	<i>b. Cactus</i>	635	FBOP	<i>b. Opiniâtre</i>	644
FBJE	<i>b. Epernay</i>	637	FBOQ	<i>b. C.19..</i>	633
FBJI	<i>b. Impétueuse</i>	640	FBOS	<i>b. Obusier</i>	644
FBJL	<i>b. Mécanicien principal Lestin</i>	643	FBOU	<i>b. Bouclier</i>	632
FBJR	<i>b. Orage</i>	644	FBOV	<i>b. C. 9 ..</i>	633
FBJS	<i>b. Sans-Souci</i>	646	FBOW	<i>b. C. 15</i>	633
FBJU	<i>b. C.70</i>	634	FBOY	<i>b. Torpilleur 315</i>	649
FBJY	<i>b. Joveuse</i>	641	FBOZ	<i>b. C. 94</i>	634
FBJZ	<i>b. C.83</i>	634	FBPA	<i>b. Ailette</i>	630
FBKD	<i>b. Audacieuse</i>	631	FBPE	<i>b. Pertuisane</i>	645
FBKH	<i>b. Sakalave</i>	646	FBPG	<i>b. Primauguet</i>	645
FBKL	<i>b. Flamant</i>	638	FBPI	<i>b. Pierrier</i>	645
FBKN	<i>b. Renard</i>	646	FBPK	<i>b. C. 13</i>	633
FBKN	<i>b. Tonkinois</i>	648	FBPL	<i>b. Peuplier</i>	645
FBKP	<i>b. Poignard</i>	645	FBPM	<i>b. Bapaume</i>	632
FBKU	<i>b. Fauconneau</i>	638	FBPN	<i>b. Paon</i>	644
FBKX	<i>b. Torpilleur</i>	649	FBPO	<i>b. Emporté</i>	637
FBKY	<i>b. Kabyle</i>	641	FBPR	<i>b. Protêt</i>	645
FBKZ	<i>b. C.90</i>	634	FBPS	<i>b. Séduisant</i>	647
FBLA	<i>b. Alerte</i>	630	FBPT	<i>b. Tintamarre</i>	648
FBLC	<i>b. Curieuse</i>	636	FBPY	<i>b. C. 4 FBPY</i>	633
FBLD	<i>b. Bar-le-Duc</i>	632	FBPZ	<i>b. Torpilleur 363</i>	649
FBLE	<i>b. Bélier</i>	632	FBQE	<i>b. Escopette</i>	638
FBLG	<i>b. Gélinotte</i>	639	FBQG	<i>b. Torpilleur 288</i>	648
FBLK	<i>b. Mameluck</i>	642	FBQH	<i>b. Hache</i>	639
FBLN	<i>b. Lantana</i>	641	FBQI	<i>b. Ipéca</i>	640
FBLO	<i>b. Lobélia</i>	641	FBQK	<i>b. C. 98</i>	635
FBLP	<i>b. Lapérousse</i>	641	FBQL	<i>b. C. 92</i>	634
FBLQ	<i>b. Lansquenét</i>	641	FBQM	<i>b. Meuse</i>	643
FBLS	<i>b. Lassigny</i>	641	FBQN	<i>b. Orme</i>	644
FBLT	<i>b. Altair</i>	630	FBQO	<i>b. Oriflamme</i>	644
FBLU	<i>b. Luronne</i>	642	FBQR	<i>b. Régulus FBQR</i>	645
FBLV	<i>b. Loup-Cervier</i>	642	FBQS	<i>b. Sirocco</i>	647
FBLX	<i>b. C.87</i>	634	FBQW	<i>b. C. 75</i>	634
			FBQX	<i>b. Torpilleur 369</i>	649

		PAGE		PAGE	
FBQY	b. Ondine II ..	644	FBWQ	b. Francisque ..	639
FBQZ	b. Torpilleur 316 ..	649	FBWR	b. Ramier ..	645
FBRA	b. Arabe ..	631	FBWU	b. Torpilleur 338 ..	649
FBRE	b. Reims ..	646	FBWX	b. C. 12 ..	633
FBRRH	b. Rhinoceros ..	646	FBXA	b. Arras ..	631
FBRI	b. Commandant Riviere ..	636	FBXF	b. Étourdi ..	638
FBRJ	b. C. 18 ..	633	FBXG	b. Francis-Garnier ..	639
FBRL	b. Rafale ..	645	FBXM	b. Moqueuse ..	643
FBRM	b. Remiremont ..	646	FBXR	b. Enseigne-Roux ..	637
FBRN	b. René ..	646	FBXU	b. Torpilleur 339 ..	649
FBRs	b. Sagaie ..	646	FBXW	b. Torpilleur 340 ..	649
FBRU	b. Robuste ..	646	FBYC	b. Capitaine-Mehl ..	635
FBRW	b. C. 5 ..	633	FBYG	b. Torpilleur 349 ..	649
FBRY	b. Commandant ..	636	FBYP	b. Torpilleur 310 ..	649
FBRZ	b. Torpilleur 326 ..	649	FBYR	b. Yser FBYR ..	651
FBSA	b. Sape ..	646	FBYT	b. Torpilleur 324 ..	649
FBSC	b. Scarpe ..	647	FBYU	b. Yucca FBYU ..	651
FBSG	b. Sanglier ..	646	FBYX	b. Torpilleur 341 ..	649
FBSI	b. Sioux ..	647	FBYZ	b. C. 10 ..	633
FBSJ	b. Sajaou ..	646	FBZC	b. Coutelas ..	636
FBSL	b. Sénégalais ..	647	FBZH	b. Harpon ..	640
FBSM	b. Marbre ..	642	FBZK	b. Torpilleur 334 ..	649
FBSN	b. Sentinelle ..	647	FBZM	b. Marne FBZM ..	642
FBSO	b. Somme FBSO ..	647	FBZN	b. Némésia ..	643
FBSP	b. Spahi ..	647	FBZQ	b. C. 69 ..	634
FBSR	b. Sarigue ..	647	FBZR	b. Raillieuse ..	645
FBSV	b. Surveillante ..	647	FBZT	b. Téméraire FBZT ..	648
FBSW	b. Torpilleur 318 ..	649	FBZV	b. Torpilleur 322 ..	649
FBSY	b. Seignelay ..	647	FBZW	b. C. 97 ..	635
FBTA	b. Tapageuse ..	648	FBZY	b. Fier ..	638
FBTC	b. Camélia ..	635	GB	c. Glace Bay ..	536
FBTG	b. Touareg ..	649	GM	c. Stettin ..	554
FBTH	b. Tahure ..	648	GAB	b. Homer City ..	764
FBTI	b. Tirailleur ..	648	GAC	b. Bangala ..	731
FBTL	b. Toul ..	649	GAD	b. Bharata ..	734
FBTM	b. Magon ..	642	GAF	b. Canara ..	738
FBTN	b. Tramontane ..	649	GAG	b. Rooke ..	794
FBTQ	b. C. 14 ..	633	GAM	b. Tyne ..	805
FBTU	b. Tumulte ..	650	GAN	b. Eileen ..	753
FBTV	b. C. 93 ..	634	GAO	b. City of York ..	742
FBUC	b. Cognée ..	636	GAP	b. Isis GAP ..	766
FBUD	b. C. 73 ..	634	GAQ	b. Osiris ..	785
FBUH	b. C. 20 ..	633	GAR	b. Chindwara ..	740
FBUI	b. Suipe ..	647	GAX	b. Marnetown ..	776
FBUL	b. Buffe ..	633	GBB	b. City of Poona ..	741
FBUP	b. Pique ..	645	GBC	b. Coronado ..	748
FBUV	b. C. 67 ..	634	GBE	b. Niagara ..	698
FBUX	b. C. 86 ..	634	GBE	b. Niagara ..	782
FBUZ	b. Torpilleur 321 ..	649	GBF	b. Elswick Grange ..	753
FBVA	b. Vaillante ..	650	GBG	b. Nevasa ..	781
FBVD	b. Verdun ..	650	GBJ	b. Benalla ..	733
FBVH	b. La Hire ..	641	GBN	b. Bloemfontein ..	735
FBVI	b. Victoire ..	650	GBO	b. Gujarat ..	761
FBVJ	b. C. 74 ..	634	GBP	b. Kasama ..	768
FBVL	b. Vitry-le-François ..	651	GBQ	b. Nestor ..	781
FBVM	b. Malicieuse ..	642	GBS	b. Toronto GBS ..	804
FBVP	b. C. 99 ..	635	GBT	b. Colaba ..	747
FBVQ	b. Vauquois ..	650	GBU	b. Ulysses ..	806
FBVR	b. Rapière ..	645	GBV	b. Coceyanna ..	747
FBVT	b. Trident FBVT ..	649	GBW	b. City of Karachi ..	741
FBVU	b. C. 59 ..	634	GBX	b. Pinewin ..	787
FBVX	b. C. 21 ..	633	GBY	b. Kalomo ..	768
FBVY	b. Ville d'Ys ..	651	GCA	c. Tobermory Rad ..	591
FBVZ	b. C. 8 ..	633	GCB	c. Lochboisdale Rad ..	589
FBWA	b. Aigle ..	630	GCC	c. Cullercoats Rad ..	587
FBWC	b. Claymore ..	635	GCD	b. Nagoya ..	780
FBWH	b. Hardi ..	640	GCE	b. Custodian ..	749
FBWI	b. Intrépide ..	640	GCF	b. Dilwara ..	751
FBWM	b. Marcassin ..	642	GCH	b. Bankura ..	731

		PAGE			PAGE
GCI	b. Wayfarer ..	811	GJJ	b. Idaho ..	765
G CJ	b. Ardeola ..	729	GJK	b. Irishman ..	766
GCK	c. Valentia Rad ..	591	GJL	b. Junin ..	767
GCL	b. Borderer ..	735	GJN	b. Lama ..	771
GCM	b. Barala ..	731	GJO	b. Kenuta ..	769
GCS	c. Caister-on-Sea Rad ..	586	GJP	b. Kia Ora ..	769
GCT	b. Barjora ..	731	GJQ	b. Kumeric ..	770
GCU	b. Dunera ..	752	GJV	b. Lackawanna ..	770
GCV	b. Neurallia ..	781	GJW	b. Rosarina (La) ..	771
GCW	b. Novara ..	783	GJX	b. Shakespear ..	797
GCX	b. Waroonga ..	810	GJY	b. Levant II ..	771
G CY	b. Poleric ..	787	GKA	c. Guernsey Rad ..	588
GCZ	b. Euryalus ..	755	GKC	b. Ashtabula ..	730
GDA	b. Fazilka ..	755	GKD	b. Malta ..	774
GDB	b. Patuca ..	786	GKE	b. Mamari ..	774
GDC	b. Fultala ..	757	GKF	b. Lhasa ..	771
GDD	b. City of Dunkirk ..	741	GKG	b. Canning ..	738
GDF	b. Gracchus ..	750	GKG	c. Heysham Harbour Rad ..	588
GDG	b. Tennyson ..	803	GKH	b. Manchester City ..	774
GDH	b. Byron ..	737	GKJ	b. Marengo ..	776
GDJ	b. Appam ..	728	GKK	b. Manhattan ..	775
GDK	b. Chaudière ..	740	GKL	b. Matatua ..	777
GDL	b. Baroda ..	731	GKM	b. Michigan ..	778
GDN	b. Kentucky ..	769	GKO	b. Naneric ..	781
GDO	b. Bovic ..	735	GKP	b. Nankin ..	781
GDP	b. City of Lincoln ..	741	GKR	c. Wick Rad ..	591
GDR	b. Cufic ..	749	GKS	b. Knight Companion ..	769
GDU	b. Tropic ..	805	GKT	b. Knight Templar ..	769
GDV	b. Ingoma ..	766	GKV	b. Nore ..	782
GDW	b. Cornishman ..	748	GKW	b. Normannia ..	782
GDX	c. Isle of Man Rad ..	588	GKY	b. Nyanza ..	783
GEC	c. Castle Bromwich Rad ..	586	GLC	b. Paris GLC ..	785
GED	c. Croydon Rad ..	587	GLD	c. Land's End Rad ..	588
GEG	c. Lympe Rad ..	589	GLF	b. Kathlamba ..	768
GEM	c. Didsbury ..	587	GLG	b. Pakeha ..	785
GER	c. Renfrew Rad ..	590	GLH	b. Jason GLH ..	767
GFA	c. Air Ministry ..	586	GLI	b. Cameronian ..	738
GFB	c. Baldonnel ..	586	GLJ	b. Linga ..	772
GFC	c. Cranwell ..	587	GLK	b. Parana ..	785
GFI	b. Amber ..	727	GLL	b. Pardo ..	785
GFI	c. Andover ..	586	GLM	b. Lunka ..	773
GFM	c. Catewater ..	586	GLN	b. Peru GLN ..	787
GFZ	c. Howden ..	588	GLQ	b. Potomac ..	790
GFF	c. Felixstowe ..	587	GLR	b. Prince George GLR ..	790
GFO	c. Shotwick ..	590	GLS	b. Prince Rupert ..	790
GFW	c. Lee-on-Solent ..	589	GLT	b. Quilpue ..	791
GHD	b. Wiltshire ..	812	GLU	b. Ramos ..	791
GIB	b. S. George ..	801	GLV	▲ Seaforth Rad ..	590
GIC	b. City of Delhi ..	741	GLY	b. Roseric ..	794
GID	b. Conqueror ..	747	GLZ	b. Royston Grange ..	795
GIE	b. Trewellard ..	805	GMB	b. Sardinia ..	795
GIF	b. Berbice ..	734	GMC	b. Sicilia GMC ..	797
GII	b. Galileo ..	757	GMD	b. Silvertown ..	798
GIL	b. Hantonia ..	762	GMH	c. Malin Head Rad ..	589
GIR	b. Highland Glen ..	763	GMI	b. Indore ..	766
GIT	b. Manora ..	775	GMI	b. Muttra ..	780
GIU	b. Highland Laddie ..	763	G MK	b. Bayano ..	732
GIW	b. North Point ..	783	GML	b. Obra ..	783
GIX	b. Carventum ..	739	GMM	b. Sutherland Grange ..	800
GIY	b. Highland Loch ..	763	GMN	b. Chaleur ..	740
GIZ	b. Rimouski ..	793	GMO	b. Suveric ..	800
GJA	b. Highland Pride ..	763	GMP	b. Syria GMP ..	801
GJB	b. Highland Rover ..	763	G MQ	b. Tara ..	802
GJE	b. Honorius ..	764	GMR	c. Gambela ..	518
GJF	b. Huanchaco ..	765	GMR	b. Taroba ..	802
GJG	b. Hyacinthus ..	765	G MT	b. Teesta ..	802
GJH	b. Hydaspes ..	765	GMU	b. Thongwa ..	803
GJI	b. Hypatia ..	765	GMV	b. Tonawanda ..	804

		PAGE			PAGE
GMW	b. Okara	784	GQY	b. Telesfora de Larri-	
GMX	b. Antiope	728		naga	803
GMY	b. Merkara	778	GQY	b. Tenasserim	803
GMZ	b. Vasari	806	GQZ	b. Manco	775
GNA	b. Kamarina	768	GRB	b. Baron Polwarth	732
GNA	b. Salamis	795	GRD	b. Devona	750
GNC	b. City of Edinburgh ..	741	GRG	b. Cambria GRG	738
GNE	b. Waimana	807	GRI	b. Mississippi	779
GNF	c. North Foreland Rad	589	GRJ	b. Kurdistan	770
• GNI	c. Niton Rad	589	GRK	b. Vallejo	806
GNJ	c. Fastnet	587	GRL	c. Fishguard Rad	587
GNK	b. Waipara	808	GRM	b. Volumnia	807
GNL	b. Onda	784	GRN	c. Rathlin Island	
GNM	b. Highland Piper	763		Rad	590
GNR	b. S. Tudno	801	GRO	b. Egba	753
GNS	b. Karroo	768	GRP	b. Burmese Prince	737
GNU	b. Oolobarria	784	GRR	b. Scotia GRR	796
GNV	c. Newhaven Rad	589	GRS	b. Portuguese Prince ..	790
GNW	b. Orissa	784	GRT	b. Liddesdale	771
GNX	b. Treilssick	804	GRT	b. Sittang	798
GNY	b. Orna	785	GRU	b. Katherine Park	768
GNZ	b. Ozarda	785	GRV	b. Suffolk	800
GOA	b. Queda	791	GRX	b. Trentino	804
GOB	b. Querimba	791	GRY	b. Dorset	751
GOC	b. Quiloa	791	GRZ	b. Ixion	767
GOD	b. Sangola	795	GSA	b. Uncas	667
GOE	b. Santhia	795	GSB	b. Port Macquarrie ..	789
GOF	b. Sealda	796	GSC	b. Protesilaus	791
GOG	b. Sutherland	800	GSD	b. Tascalusa	667
GOH	b. Sofala	798	GSF	b. Shropshire	797
GOI	b. Surada	800	SGS	b. Tamaha	667
GOJ	b. Torilla	804	GSF	b. Talthybius	802
GOL	b. Ula	806	GSI	b. Tahchee	667
GOM	b. Trevarrack	805	GSJ	b. Teucer	803
GON	b. Uinta	806	GSK	b. Tatarax	802
GOO	b. Upada	806	GSL	c. Ballycastle Rad	586
GOP	b. Urlana	806	GSM	b. Winamac	667
GOQ	b. Culna	749	GSO	b. Titan GSO	803
GOR	b. Ujina	805	GSS	b. Shabonee	667
GOU	b. North Sands	783	GSW	c. Stonehaven Rad	590
GOV	b. Pentaur	787	GTC	b. Antilochus	728
GOX	b. Trecarrell	804	GTD	b. Bellerophon	733
GOY	b. Trematon	804	GTF	b. Cyclops	749
GOZ	b. Wulsty Castle	813	GTG	b. Satanta	796
GPB	b. Homeric	764	GTH	b. Ajana	726
GPE	b. Chakrata	740	GTJ	b. Argyllshire	729
GPF	b. Amsterdam	727	GTL	b. Oanfa	783
GPH	c. Guayaquil	545	GTN	b. Wabasha	667
GPL	b. Roulers	794	GTP	b. Faraday GTP	755
GPN	b. Antrim	728	GTR	b. Masconomo	667
GPP	b. Duchess of Devon-		GTS	b. Monarch GTS	779
	shire	751	GTU	b. Oneka	667
GPQ	c. Parkeston Quay Rad	589	GTX	b. Wilston	812
GPR	b. Londonderry	772	GTU	b. Aspinet	667
GPS	b. Manxman	775	GTZ	b. Port Lincoln	789
GPT	b. Chanda	740	GUA	b. Arakaka	729
GPU	b. Chupra	741	GUB	b. Anglo-Saxon	727
GPV	b. Nessian	781	GUC	b. Magdalena	773
GPW	b. Lakonia	771	GUD	b. Orotava GUD	785
GPZ	b. Escalona	754	GUE	b. Oruba	785
GQA	b. Ayrshire	731	GUF	b. Tagus	801
GQB	b. Perthshire	787	GUH	b. Trent	804
GQC	b. Durham GQC	752	GVI	b. Empress	754
GQE	b. Sequoya	667	GVI	b. City of Bombay	741
GQM	c. Inishtrahull Rad ..	588	GUK	b. Engadine	754
GQO	b. Transmitter	804	GUL	b. Invicta	766
GQP	b. Munardan	780	GUM	b. Onward	784
GQR	b. Lady Crundall	770	GUO	b. Riviera	793
GQS	b. Lady Brassey	770	GUQ	b. Minia	779

		PAGE			PAGE
GUR	<i>c.</i> Folkestone Harbour		GYA	<i>b.</i> City of Norwich ..	741
	Rad	587	GYB	<i>b.</i> Ophir GYB ..	784
GUS	<i>b.</i> Greenore	761	GYD	<i>b.</i> Matura	777
GUT	<i>b.</i> Rathmore	792	GYF	<i>b.</i> Exmouth II ..	755
GUU	<i>b.</i> Galtee More ..	757	GYG	<i>b.</i> City of Colombo ..	741
GUV	<i>b.</i> Chiria	740	GYH	<i>b.</i> Empress of France	754
GUX	<i>b.</i> Asiatic	730	GYJ	<i>b.</i> S. Andrew GYJ ..	801
GUZ	<i>b.</i> Ajax	726	GYL	<i>b.</i> S. David	801
GVA	<i>c.</i> Cross Sand Lightship	587	GYM	<i>b.</i> S. Patrick GYM ..	801
GVB	<i>c.</i> East Goodwin Light-		GYN	<i>b.</i> S. Fraterno	801
	ship	587	GYO	<i>b.</i> Manavi	774
GVC	<i>c.</i> Gull Lightship ..	588	GYQ	<i>b.</i> Kazembe	769
GVD	<i>c.</i> South Goodwin Light-		GYR	<i>b.</i> Vitruvia	807
	ship	590	GYX	<i>b.</i> Ben Nevis	734
GVE	<i>c.</i> Sunk Lightship ..	591	GYV	<i>b.</i> Koranna	770
GVF	<i>c.</i> Tongue Lightship ..	591	GZC	<i>b.</i> Djerissa	751
GVH	<i>b.</i> Clan Macewen ..	743	GZG	<i>b.</i> Aydon	731
GVI	<i>b.</i> Malakuta	774	GZH	<i>b.</i> Tacoma	667
GVJ	<i>b.</i> Mahanada	773	GZI	<i>b.</i> Francis Batey ..	756
GVK	<i>b.</i> Ericus	754	GZJ	<i>b.</i> Stockwell	799
GVL	<i>b.</i> Clan Macquarrie ..	745	GZM	<i>b.</i> Clan Mackellar ..	744
GVM	<i>b.</i> Clan Macrae	745	GZU	<i>b.</i> Vanquisher ..	806
GVN	<i>b.</i> Maidan	774	GZX	<i>b.</i> Minnedosa	779
GVO	<i>b.</i> Nolissement	782	GZY	<i>b.</i> Idomeneus	765
GVO	<i>b.</i> Dunrobin	752	G'IA	<i>c.</i> Alessandria	559
GVR	<i>b.</i> Cento	739	G'IB	<i>c.</i> Catania	559
GVS	<i>b.</i> Clan Macgillivray ..	744	G'IC	<i>c.</i> Cuneo	560
GVT	<i>b.</i> Burma	737	G'ID	<i>c.</i> Cagliari	559
GVO	<i>b.</i> Clan Ross	746	G'IF	<i>c.</i> Firenze	560
GVO	<i>b.</i> Clan Ogilvy	746	G'IG	<i>c.</i> Genova	560
GVW	<i>b.</i> War Nipigon	810	G'IH	<i>c.</i> Chieti	560
GVX	<i>b.</i> Ethelfreda	755	G'IK	<i>c.</i> Catanzaro	560
GVY	<i>b.</i> Turkistan	805	G'IL	<i>c.</i> Potenza	561
GVZ	<i>b.</i> Cauca	739	G'IN	<i>c.</i> Novara	561
GWA	<i>b.</i> Bharno	734	G'IP	<i>c.</i> Perugia	561
GWC	<i>b.</i> Martaban	776	G'IR	<i>c.</i> Roma	561
GWD	<i>b.</i> Henzada	763	G'IS	<i>c.</i> Salerno	561
GWG	<i>b.</i> Chindwin	740	G'IU	<i>c.</i> Ancona G'IU ..	559
GWH	<i>b.</i> Maraval	776	G'IZ	<i>c.</i> Torino	561
GWI	<i>b.</i> Port Albany	789	G'RD	<i>c.</i> Verona	561
GWJ	<i>b.</i> Ganges	757	G'RF	<i>c.</i> Ravenna	561
GWK	<i>b.</i> Chenab	740	G'RH	<i>c.</i> Bologna	559
GWL	<i>b.</i> Sutlej	800	G'RJ	<i>c.</i> Milano	561
GWN	<i>b.</i> Glenloch	759	G'RK	<i>c.</i> Pienza	561
GWO	<i>b.</i> Arracan	729	G'RP	<i>c.</i> Brescia	559
GWP	<i>b.</i> Mandalay	775	G'RY	<i>c.</i> Padova	561
GWV	<i>b.</i> Michael	778	GABC	<i>b.</i> Adelaide	609
GWV	<i>b.</i> Alban	726	GABD	<i>b.</i> Anzac	609
GWX	<i>b.</i> Glenbridge	758	GABF	<i>b.</i> Australia GABF	610
GWZ	<i>b.</i> Meissonier	777	GABH	<i>b.</i> Brisbane	610
GXA	<i>b.</i> Tregantle	804	GABJ	<i>b.</i> Encounter	611
GXB	<i>b.</i> Virgilia	807	GABL	<i>b.</i> Fantome	611
GXC	<i>b.</i> Apollo GXC	728	GABM	<i>b.</i> Geranium	611
GXD	<i>b.</i> Sargasso	795	GABN	<i>b.</i> Huon	611
GXE	<i>b.</i> Essex	755	GABP	<i>b.</i> Mallow	611
GXF	<i>b.</i> Spheroid	799	GABQ	<i>b.</i> Marguerite	611
GXH	<i>b.</i> Coys	748	GABR	<i>b.</i> Melbourne GABR	611
GXI	<i>b.</i> Capac	738	GABS	<i>b.</i> Parramatta	612
GXX	<i>b.</i> Weltondale	811	GABT	<i>b.</i> Platypus	612
GXM	<i>b.</i> Mull	780	GABV	<i>b.</i> Protector GABV ..	612
GXO	<i>c.</i> Crookhaven	587	GABW	<i>b.</i> Stalwart	612
GXQ	<i>b.</i> Burnhope	737	GABX	<i>b.</i> Submarine J.1 ..	612
GXS	<i>b.</i> Ambassador	727	GABY	<i>b.</i> Submarine J.2 ..	612
GXT	<i>b.</i> Leafeld	771	GABZ	<i>b.</i> Submarine J.3 ..	612
GXU	<i>b.</i> Huntscape	765	GACB	<i>b.</i> Submarine J.4 ..	612
GXW	<i>b.</i> Clumberhall	747	GACD	<i>b.</i> Submarine J.5 ..	612
GXX	<i>b.</i> Arncliffe	729	GACF	<i>b.</i> Submarine J.7 ..	612
GXX	<i>b.</i> Heathside	763	GACH	<i>b.</i> Success	612
GXY	<i>b.</i> Carston	739	GACJ	<i>b.</i> Swan GACJ	612

		PAGE			PAGE
GACK	b. Swordsman ..	612	GBJS	b. Ehrenfels ..	753
GACL	b. Sydney GACL ..	612	GBJT	b. Delta GBJT ..	750
GACM	b. Tasmania GACM ..	612	GBJV	b. Aymeric ..	731
GACN	b. Tattoo ..	612	GBJW	b. Orteric ..	785
GACP	b. Torrens ..	613	GBJX	b. Tymeric ..	805
GACQ	b. Una ..	613	GBJY	b. Anni ..	728
GACR	b. Warrego ..	613	GBJZ	b. Scotia GBJZ ..	796
GACS	b. Yarra ..	613	GBKC	b. Derindje ..	750
GBCD	b. Kronenfels ..	770	GBKD	b. Treuenfels ..	804
GBCF	b. Falkenfels ..	755	GBKF	b. Plata GBKF (La) ..	771
GBCI	b. Chemnitz ..	740	GBKJ	b. Wahehe ..	807
GBCK	b. Matadi ..	777	GBKL	b. Prinz Ludwig ..	791
GBCL	b. Bradford City ..	735	GBKM	b. Friedrichsruhe ..	757
GBCM	b. War Pathan ..	810	GBKN	b. König Friedrich August ..	770
GBCN	b. Wentworth ..	811	GBKQ	b. Wolfram ..	812
GBCP	b. Leicester ..	771	GBKR	b. Luise Horn ..	773
GBCO	b. Itajahy ..	767	GBKS	b. Main ..	774
GBCR	b. Cordoba GBCR ..	748	GBKW	b. Atta ..	730
GBCS	b. Bürgermeister Schroder ..	737	GBKX	b. Schwinge ..	796
GBCT	b. Regina GBCT ..	792	GBKY	b. Solfels ..	799
GBCV	b. Germanicus ..	758	GBKZ	b. Schwarzenfels ..	796
GBCW	b. S. Cruz ..	801	GBLC	b. Augsburg ..	730
GBCX	b. Furst Bulow ..	757	GBLD	b. Franziska ..	757
GBCY	b. Pera ..	787	GBLF	b. Konigin Luise ..	770
GBCZ	b. Clare Hugo Stinnes ..	747	GBLJ	b. Hebe ..	637
GBDC	b. Artemisia ..	729	GBLK	b. Normannia GBLK ..	783
GBDF	b. Sonnenfels ..	799	GBLM	b. Gudron ..	761
GBDJ	b. Bermuda ..	734	GBLN	b. Gera ..	758
GBDK	b. Weissenfels ..	811	GBLP	b. Elbe ..	753
GBDL	b. Alster ..	727	GBLQ	b. Atto ..	730
GBDM	b. Wolfsburg ..	812	GBLR	b. Spezia ..	799
GBDN	b. Heluan ..	763	GBLS	b. Pendennis ..	786
GBDP	b. Roda ..	793	GBLV	b. Greiffenfels ..	761
GBDQ	b. Rio Pardo ..	793	GBLW	b. Wotan GBLW ..	813
GBDR	b. Eduard Woermann ..	753	GBLY	b. Naimes ..	780
GBDS	b. Lucie Woermann ..	773	GBLZ	b. Eichsfeld ..	753
GBDT	b. Prinzessin ..	791	GBMZ	b. Hornsee ..	764
GBDV	b. Gertrud ..	758	GBMC	b. Rhenania ..	793
GBDW	b. Rio Negro GBDW ..	793	GBMD	b. Cap Polonio ..	738
GBDX	b. Crostafels ..	749	GBMF	b. Gerfreid ..	758
GBDY	b. Aschenburg ..	729	GBMK	b. Prinz Hubertus ..	791
GBDZ	b. Altenfels ..	727	GBML	b. Nerbudda ..	781
GBFC	b. Kybfels ..	770	GBMN	b. Bosporous ..	735
GBFD	b. Heilbronn ..	763	GBMP	b. Antwerpen ..	728
GBFE	b. Almeria ..	727	GBMQ	b. Waldenburg ..	808
GBFJ	b. Pioneer GBFJ ..	787	GBMR	b. Hamburg ..	762
GBFK	b. Giessen ..	758	GBMS	b. Erfurt ..	754
GBFL	b. Gundomar ..	761	GBMT	b. Austria ..	731
GBFM	b. Alexandra Woermann ..	727	GBMV	b. Binfield ..	734
GBFN	b. Horncap ..	764	GBMW	b. Roma GBMW ..	793
GBFO	b. Arensburg ..	729	GBMX	b. Karl Leonhardt ..	763
GBFR	b. Hornfels ..	764	GBMY	b. Isis GBMY ..	766
GBFS	b. Gallipoli ..	757	GBMZ	b. Leapark ..	771
GBFT	b. Windhuk ..	812	GBNC	b. Baron Garioch ..	732
GBFV	b. Swakopmund ..	800	GBND	b. Plauen ..	788
GBFW	b. Lippe ..	772	GBNF	b. Sausenburg ..	796
GBFX	b. Tilly Russ ..	803	GBNJ	b. Polo ..	788
GBFY	b. Totmes ..	804	GBNK	b. Emerald ..	754
GBJD	b. Irmgard ..	766	GBNL	b. Sofia ..	798
GBJF	b. Frankfurt ..	756	GBNP	b. Waitemata ..	808
GBJK	b. Bremen ..	736	GBNQ	b. Grangemouth ..	760
GBJL	b. Alma ..	727	GBNR	b. Cramond ..	748
GBJM	b. Masuria ..	777	GBNS	b. Dessau ..	750
GBJN	b. Ravensworth ..	792	GBNT	b. Olympos ..	781
GBJP	b. Ypiranga ..	813	GBNV	b. Pyrgos ..	791
GBJQ	b. Rudelsburg ..	795	GBNW	b. Galtymore ..	757
GBJR	b. Bretwalda ..	736	GBNX	b. Fulmar ..	757
				b. Haimon ..	761

		PAGE			PAGE
GBNY	b. Herman Sauber ..	763	GBTD	b. Comerio ..	747
GBNZ	b. Mary Horlock ..	776	GBTF	b. Etha Rickmers ..	755
GBPC	b. Uhlenhorst ..	805	GBTJ	b. Newton GBTJ ..	782
GBPD	b. Arabia ..	728	GBTK	b. Dania ..	749
GBPF	b. Oehringen ..	784	GBTL	b. Rugia ..	795
GBPJ	b. Tremorvah ..	804	GBTM	b. Mecklenburg GBTM	777
GBPK	b. Frankdale ..	756	GBTN	b. Porta ..	789
GBPL	b. Knight Pendor ..	769	GBTQ	b. Lipsos ..	772
GBPM	b. Bathurst ..	732	GBTR	b. Wartburg ..	811
GBPN	b. Sieglinde ..	797	GBTS	b. Glenearn ..	759
GBPQ	b. Steigerwald ..	799	GBTV	b. Rossall ..	794
GBPR	b. City of Melbourne ..	741	GBTW	b. Nuddea ..	783
GBPS	b. Tasmania ..	802	GBTX	b. Itauri ..	767
GBPT	b. Kigoma ..	769	GBTY	b. Lubeck ..	773
GBPV	b. Karpathos ..	768	GBTZ	b. Neumark ..	781
GBPW	b. Sheaf Mount ..	797	GBVC	b. Kandelfels ..	768
GBPX	b. Nasmyth ..	781	GBVD	b. Sesostris ..	797
GBPY	b. Pinnau ..	787	GBVK	b. Talune ..	802
GBPZ	b. Ammon ..	727	GBVL	b. Schwarzenfelde ..	796
GBQC	b. Glenade ..	758	GBVM	b. Palmas (Las) ..	771
GBQD	b. Harvestehude ..	762	GBVP	b. Marksburg ..	776
GBQE	b. Solingen ..	799	GBVQ	b. Hilda ..	763
GBQJ	b. Haliartus ..	761	GBVR	b. Edmund Hugo Stin-	
GBQK	b. Weissenfelde ..	811		nes ..	753
GBQL	b. Schwaben ..	796	GBVS	b. Gustav ..	761
GBQM	b. Barbadian ..	731	GBVT	b. John Heidmann ..	767
GBQN	b. Admiral Hamilton ..	725	GBVW	b. War Hagara ..	809
GBQP	b. Wangaratta ..	808	GBVX	b. Castilian ..	739
GBQR	b. Haresfield ..	762	GBVY	b. Grodno ..	761
GBQS	b. Cranfield ..	748	GBVZ	b. Thurso ..	803
GBQT	b. Severn ..	797	GBWC	b. Glyndwr ..	759
GBQV	b. Somme GBQV ..	799	GBWF	b. Princess Beatrice	
GBQW	b. Sabor ..	795		GBWF ..	790
GBQX	b. Radnorshire ..	791	GBWJ	b. Dora ..	751
GBQY	b. Narenta GBQY ..	781	GBWK	b. Elmtree ..	753
GBQZ	b. Nebraska ..	781	GBWL	b. Stephan ..	799
GBRC	b. Silarus ..	797	GBWN	b. Mardinian ..	776
GBRD	b. Sirus ..	798	GBWP	b. Urbino ..	806
GBRF	b. Nictheroy ..	782	GBWR	b. Winfreid ..	812
GBRJ	b. Syrian Prince ..	801	GBWS	b. Fabian ..	755
GBRK	b. Ballygally Head ..	731	GBWT	b. Kerkyra ..	769
GBRL	b. Kenbane Head ..	769	GBWV	b. Hans Wilhelm Hem-	
GBRM	b. Franz Wilke ..	787		soth ..	762
GBRN	b. Haworth ..	762	GBWX	b. Minna Horn ..	779
GBRP	b. Ganelon ..	757	GBWY	b. E. Russ ..	754
GBRQ	b. Javary GBRQ ..	767	GBWZ	b. Calderon ..	737
GBRT	b. Valencia GBRT ..	806	GBXC	b. Cervantes ..	739
GBRV	b. Huberfels ..	765	GBXD	b. Cortes ..	748
GBRW	b. Schildturm ..	796	GBXF	b. Hilde Hugo Stinnes	763
GBRX	b. Trevelyan ..	805	GBXJ	b. Hedwig Heidmann ..	763
GBRY	b. War Kookri ..	809	GBXK	b. Anna Doretta Boog	728
GBSC	b. Bahia Castillo ..	731	GBXL	b. Elbing ..	753
GBSD	b. Hersfeld ..	763	GBXM	b. Wilhelm Hemsoth ..	812
GBSF	b. Brandenburg GBSF	735	GBXN	b. Eric Petersen ..	754
GBSJ	b. Adventuress ..	726	GBXP	b. War Mogul ..	809
GBSK	b. Lizzy ..	772	GBXR	b. Tannenbergl ..	802
GBSL	b. Adolph Woermann ..	726	GBYC	b. Forst ..	756
GBSM	b. S. Fe ..	801	GBYF	b. Erika ..	754
GBSN	b. Sakkarah ..	795	GBYJ	b. Shandon GBYJ ..	797
GBSP	b. Meteor ..	778	GBYK	b. Brandenburg GBYK	735
GBSQ	b. Masula ..	777	GBYL	b. Answald ..	728
GBSR	b. Thistletoe ..	803	GBYM	b. Jenny ..	767
GBST	b. Bata ..	732	GBYN	b. Ilmenau ..	765
GBSV	b. Boma ..	735	GBYP	b. Piako ..	787
GBSW	b. New Brunswick ..	781	GBYQ	b. Kittiwake ..	769
GBSX	b. New Mexico ..	781	GBYR	b. City of Oxford ..	741
GBSY	b. New Georgia ..	781	GBYS	b. Nienburg ..	782
GBSZ	b. Dunmail ..	752	GBYT	b. Lennep ..	771
GBTC	b. Cap Verde ..	738	GBYV	b. Otto Kalthoff ..	785

956 Year-Book of Wireless Telegraphy and Telephony

		PAGE		PAGE	
GBYW	b. Hagen	761	GCKX	b. Hermione GCKX ..	763
GBYX	b. Hannover	762	GCKY	b. Knockfierna ..	769
GBYZ	b. Cassel	739	GCKZ	b. War Cloud	809
GBZC	b. Starlight	799	GCLB	b. Gogra	759
GBZD	b. Badenia	731	GCLD	b. Goral	760
GBZF	b. Patmos	786	GCLF	b. Nardana	781
GBZK	b. August Wilke ..	730	GCLJ	b. Kastalia	768
GBZL	b. Cap Finisterre ..	738	GCLK	b. Forfar	756
GBZM	b. Graf Waldersee ..	760	GCLM	b. Glenariffe	758
GBZN	b. Pangani	785	GCLN	b. War Jupiter	809
GBZP	b. Patricia	786	GCLQ	b. Arwyco	729
GBZQ	b. Alda	727	GCLR	b. Curraghmore ..	749
GBZS	b. Nitokris	782	GCLS	b. Ronalee	793
GBZV	b. Asgard	730	GCLT	b. Keelung	769
GBZW	b. Imperator	765	GCLV	b. New Toronto ..	782
GBZX	b. Mobile	779	GCLW	b. New Texas	782
GBZY	b. Stambul	799	GCLX	b. Halo	761
G CBD	b. Albionstar	726	GCLY	b. Mateba	777
G CBF	b. Portfield	789	GCLZ	b. Montazah	779
G CBJ	b. Surrey	800	G CMB	b. Mahmoudieh ..	774
G CBJ	b. Whitby Abbey ..	812	G CMD	b. Monassir	779
G CBL	b. Browning	737	G CME	b. Matama	777
G CBM	b. Bruyere	737	G CMI	b. Philadelphian ..	787
G CBN	b. Treveal	805	G CMI	b. Anglia GCNK ..	727
G CBN	b. Treverbyn	805	G CML	b. Hibernia	763
G CBO	b. Harmonic	762	G CMN	b. Gondia	760
G CBR	b. Beechpark	733	G CMP	b. Hallside	761
G CBS	b. Peshawar	787	G CMQ	b. Ashpark	730
G CBT	b. S. Bede	801	G CMR	b. Gandara	757
G CBV	b. S. Andrew GCBV ..	801	G CMS	b. Garada	757
G CBW	b. Goalpara	759	G CMT	b. Cyprian Prince ..	749
G CBX	b. Harmodius	762	G CMV	b. Trekieve	804
G CBY	b. Montrose	779	G CMW	b. Trewyn	805
G CBZ	b. Backworth	731	G CMX	b. King Alfred ..	769
G CDB	b. Coatsworth	747	G CMI	b. Algerian Prince ..	727
G CDF	b. Umtata	806	G CMZ	b. Sunpath	800
G CDJ	b. Umhloti	806	G CNI	b. Bolivian	735
G CDK	b. Shabristan	797	G CND	b. Applebranch ..	728
G CDL	b. Hornchurch	764	G CNI	b. Kara	768
G CDM	b. Bellview	733	G CNJ	b. Pinar del Rio ..	787
G CDN	b. War Dogra	809	G CNK	b. Riposto	793
G CDP	b. Gharinda	758	G CNL	b. War Cheetah ..	809
G CDQ	b. Dagenham	749	G CNM	b. Belgian	733
G CDR	b. Admiral Hastings ..	726	G CNP	b. War Smilax	810
G CDS	b. Homayun	764	G CNQ	b. Port Kembla ..	789
G CDT	b. Kapurthala	768	G CNI	b. Port Adelaide ..	789
G CDV	b. Sambre	795	G CNS	b. Natia	781
G CDW	b. Sarthe	795	G CNT	b. Nariva	781
G CDX	b. Tregenna	804	G CNV	b. Prinz Friedrich Wilhelm ..	791
G CDY	b. Kaiwarra	611	G CNW	b. Grangepark	760
G CDY	b. Kaiwarra	767	G CNX	b. Lord Guildford ..	772
G CDZ	b. Hunstanworth ..	765	G CNY	b. Waikawa	613
G CFB	b. Ben Voilich	734	G CNY	b. Waikawa	807
G CFC	b. Onega	784	G CNZ	b. Danier	749
G CFJ	b. Port Curtis	789	G CPB	b. Turcoman	805
G CFK	b. Woodarra	812	G CPD	b. Welshman	811
G CKB	b. Ciscar	741	G CPF	b. City of Bristol ..	741
G CKD	b. Colon	747	G CPI	b. City of Benares ..	741
G CKF	b. Arana	729	G CPK	b. City of Calcutta ..	741
G CKJ	b. Alamagro	726	G CPL	b. Hymettus	765
G CKL	b. Alvarado	727	G CPM	b. Katuna	768
G CKM	b. Canonese	738	G CPN	b. Kabinga	767
G CKN	b. Easterly	752	G CPO	b. Surat	800
G CKP	b. Golconda	759	G CPR	b. Kathiawar	768
G CKR	b. Lancaster Castle ..	771	G CPS	b. City of Lahore ..	741
G CKS	b. Neotsfield	781	G CPT	b. City of Naples ..	741
G CKT	b. Hazelside	763	G CPT	b. Valiant	806
G CKV	b. Trelyon	804	G CPW	b. City of Durham ..	741
G CKW	b. Harmonides	762			

		PAGE			PAGE
GCPX	b. City of London ..	741	GCVB	b. Narkunda ..	781
GCPY	b. City of Marseilles ..	741	GCVD	b. War Bharata ..	808
GCPZ	b. Bronte GCPZ ..	737	GCVF	b. War Sudra ..	811
GQCB	b. Balfe ..	731	GCVJ	b. Imkenturm ..	765
GQCD	b. Ismaila ..	766	GCVK	b. Fritz ..	757
GQCF	b. Itaura ..	767	GCVN	b. J. L. Lassen ..	767
GQCJ	b. Itola ..	767	GCVP	b. Ida Zelck ..	765
GQCK	b. Agadir GCQK ..	726	GCVO	b. Lawrence ..	771
GQCL	b. Beacon Grange ..	733	GCVR	b. War Afridi ..	808
GQCN	b. Berwick Castle ..	734	GCVS	b. War Brahmin ..	808
GQCP	b. Berwindmoor ..	734	GCVZ	b. Lunenburg ..	773
GQCR	b. Angora ..	728	GCWB	b. Iserlohn ..	760
GQCS	b. Appalachee GCQS ..	728	GCWP	b. Ninive ..	782
GQCT	b. Arankola GCQT ..	729	GCYB	b. Pretoria GCYB ..	790
GQCV	b. Arlanza ..	729	GCYD	b. Serbistan ..	797
GQCW	b. Arzila ..	729	GCYJ	b. Molton ..	779
GQCX	b. Berwindvale ..	734	GCYK	b. Western Valleys ..	811
GQCY	b. Gambhira ..	757	GCYL	b. Sunfield ..	800
GQCZ	b. Braemar Castle ..	735	GCYM	b. Suncleft ..	800
GCRB	b. Britannia GCRB ..	736	GCYN	b. Sunbank ..	800
GCRD	b. Erlesburgh ..	754	GCYP	b. Daybeam ..	750
GCRF	b. Cawdor Castle ..	739	GCYQ	b. Daybreak ..	750
GCRK	b. Cheyenne ..	740	GCYR	b. MacKarra ..	773
GCLR	b. Chile GCRL ..	740	GCYS	b. Macumba ..	773
GCRM	b. Berlin ..	734	GCYT	b. Narragansett ..	781
GCRN	b. Cluny Castle ..	747	GCYV	b. Nile GCYV ..	782
GCRP	b. Cononada ..	747	GCYW	b. Portscatho ..	790
GCRQ	b. Comanche ..	747	GCYX	b. Garbeta ..	757
GCRS	b. Commonwealth ..	747	GCYZ	b. Gazana ..	757
GCRT	b. Comrie Castle ..	747	GCZB	b. Gairsoppa ..	757
GCRV	b. Darro ..	750	GCZD	b. Gurna ..	761
GCRW	b. Delaware ..	750	GCZF	b. Gamaria ..	757
GCRX	b. Deseado ..	750	GCZJ	b. Garmula ..	757
GCRY	b. Desna ..	750	GCZK	b. War Hindoo ..	809
GCRZ	b. Demerara ..	750	GCZL	b. Arundel Castle ..	729
GCSB	b. Duendes ..	751	GCZM	b. Cilurnum ..	741
GCSB	b. Duendes ..	751	GCZN	b. Tairoa ..	802
GCSB	b. Duendes ..	751	GCZI	b. Ramon de Larrinaga ..	791
GCSB	b. Duendes ..	751	GCZR	b. Calcutta GCZR ..	737
GCSB	b. Duendes ..	751	GCZS	b. City of Leeds ..	741
GCSB	b. Duendes ..	751	GCZT	b. City of Bradford ..	741
GCSB	b. Duendes ..	751	GCZV	b. Paignton ..	785
GCSB	b. Duendes ..	751	GCZW	b. Muristan ..	780
GCSB	b. Duendes ..	751	GCZN	b. Roseworth ..	794
GCSB	b. Duendes ..	751	GCZY	b. Ellawood ..	753
GCSB	b. Duendes ..	751	GDBF	b. Unsinga ..	806
GCSB	b. Duendes ..	751	GDBJ	b. Monkton ..	779
GCSB	b. Duendes ..	751	GDBK	b. Thyra ..	803
GCSB	b. Duendes ..	751	GDBL	b. Carolus ..	739
GCSB	b. Duendes ..	751	GDBM	b. Mabriton ..	773
GCSB	b. Duendes ..	751	GDBN	b. Koranton ..	770
GCSB	b. Duendes ..	751	GDBP	b. Pilton ..	787
GCSB	b. Duendes ..	751	GDBQ	b. Waihemo ..	807
GCSB	b. Duendes ..	751	GDBR	b. Langley ..	771
GCSB	b. Duendes ..	751	GDBS	b. Moto ..	780
GCSB	b. Duendes ..	751	GDBV	b. Montgomeryshire ..	779
GCSB	b. Duendes ..	751	GDCF	b. Glassford ..	758
GCSB	b. Duendes ..	751	GDCI	b. Kuchworth ..	769
GCSB	b. Duendes ..	751	HG	c. Hamburg ..	553
GCSB	b. Duendes ..	751	HS	c. Uccle, Brussels ..	529
GCSB	b. Duendes ..	751	HW	c. Hanover ..	553
GCSB	b. Duendes ..	751	HCE	c. Esmeraldas ..	545
GCSB	b. Duendes ..	751	HCG	c. Guayaquil ..	545
GCSB	b. Duendes ..	751	HDA	b. Mizar ..	661
GCSB	b. Duendes ..	751	HDB	b. Aldebaron ..	655
GCSB	b. Duendes ..	751	HDC	b. Alioth ..	655
GCSB	b. Duendes ..	751	HDD	b. Alderanim ..	655
GCSB	b. Duendes ..	751	HFB	c. Belgrade ..	564
GCSB	b. Duendes ..	751	HFC	c. Sarajevo ..	564
GCTA	b. Kaiserin Auguste Victoria ..	768			
GCTB	b. Fort Victoria ..	756			
GCTC	b. Clan Macinnes ..	744			
GCTD	b. Lady Duncannon ..	770			
GCTE	b. Magicstar ..	773			
GCTF	b. Bonheur ..	735			
GCTG	b. Boswell ..	735			
GCTH	b. Sea Victory ..	796			
GCTI	b. Heroic ..	763			
GCTJ	b. Eskwood ..	754			
GCTK	b. Eskwood ..	754			
GCTL	b. Eskwood ..	754			
GCTM	b. Eskwood ..	754			
GCTN	b. Eskwood ..	754			
GCTO	b. Eskwood ..	754			
GCTP	b. Eskwood ..	754			
GCTQ	b. Eskwood ..	754			
GCTR	b. Eskwood ..	754			
GCTS	b. Eskwood ..	754			
GCTT	b. Eskwood ..	754			
GCTU	b. Eskwood ..	754			
GCTV	b. Eskwood ..	754			
GCTW	b. Eskwood ..	754			
GCTX	b. Eskwood ..	754			
GCTY	b. Eskwood ..	754			
GCTZ	b. Eskwood ..	754			

		PAGE		PAGE	
HGA	c. Bangkok ..	581	HNG	b. Villa Sandino ..	719
HGB	c. Singora ..	581	HNH	b. Tirso HNH ..	718
HGC	b. Bali HGC ..	711	HNI	b. Azpeitia ..	712
HGD	b. Sua Tayanchol ..	711	HNJ	b. Donastia ..	713
HGE	b. Sua Kamrensiendu ..	711	HNK	b. Wenceslao ..	719
HIA	c. S. Domingo ..	580	HNL	b. Trini ..	719
HIB	c. La Romana ..	580	HNM	b. Conдор HNM ..	713
HJB	c. Puerto Colombia ..	541	HNN	b. Cabo Socratif ..	713
HLA	b. Cabo Ortegal ..	713	HNO	b. Aviles ..	712
HLB	b. Basconia ..	712	HNP	b. Tintoré ..	718
HLC	b. Cirilo Amoros ..	713	HNQ	b. Capita Revuelta ..	713
HLD	b. El Gallo ..	714	HNR	b. José Taya ..	715
HLE	b. Iturri-Ederra ..	715	HNS	b. Anorga ..	711
HLF	b. Roger de Flor ..	717	HNT	b. Pax ..	717
HLG	b. Iturri-Gorri ..	715	HNV	c. Port Vila ..	551
HLH	b. Agustina Forner ..	711	HTD	b. Andree ..	631
HLI	b. Ibaizabal ..	714	HWM	c. Médiouna ..	567
HLJ	b. Juan Maragall ..	715	IAA	b. Ada O ..	668
HLK	b. Tordera ..	718	IAB	b. Albaro ..	668
HLL	b. Cabo Villano ..	713	IAC	b. Ansaldo 6 ..	669
HLM	b. M. Arnus ..	716	IAE	b. Pilsna ..	675
HLN	b. Begonia No. 1 ..	712	IAF	b. Brenta ..	669
HLO	b. Peris Valero ..	717	IAH	b. Ansaldo S. Georgio 2 ..	669
HLP	b. Paulina ..	717	IAI	b. Ansaldo S. Georgio 3 ..	669
HLQ	b. Begonia No. 2 ..	712	IAJ	b. Fiume ..	672
HLR	b. Rita HLR ..	717	IAK	b. Citta di Cagliari ..	670
HLS	b. Serra ..	717	IAL	b. Rosolino Orlando ..	676
HLT	b. Marques Del Turia ..	716	IAM	b. Ferdinando ..	672
HLU	b. Cabo Espartal ..	713	IAP	Palasciano ..	672
HLV	b. Salvador ..	717	IAR	b. Angelo Bondi ..	668
HLW	b. Marques de Chav- arri ..	716	IAS	b. Attualita ..	669
HLX	b. Begonia No. 3 ..	712	IAW	b. Vittoria ..	677
HLY	b. Begonia No. 6 ..	712	IAX	b. Bengasi 2 ..	669
HLZ	b. Ampurdan ..	711	IAZ	b. Derna ..	671
HMA	b. Concha ..	713	ICA	b. Africa ..	668
HMB	b. Mirentxu ..	716	ICB	c. Aspio Radio ..	559
HMC	b. Bilbanio ..	712	ICC	c. Genova Radio ..	560
HMD	b. Cresalubi ..	713	ICD	c. Cagliari Radio ..	559
HME	b. Velarde ..	719	ICE	c. Centocelle ..	560
HMF	b. Aizkori Mendi ..	711	ICF	c. Brindisi Radio ..	559
HMG	b. Capitan Segarra ..	713	ICG	c. Messina Radio ..	560
HMH	b. Andraka Mendi ..	711	ICH	c. Pantelleria ..	561
HMI	b. Arnabal Mendi ..	712	ICI	c. Maddalena Radio ..	560
HMJ	b. Arantzazu ..	711	ICJ	c. Coltauo ..	560
HMK	b. Astondo Mendi ..	712	ICK	c. Bengasi Radio ..	543
HML	b. Macarena ..	715	ICM	c. Tripoli Radio ..	585
HMM	b. Fernando L. de Ibarra ..	714	ICN	c. Centopozzi Radio ..	560
HMN	b. Biskargi Mendi ..	712	ICO	c. Napoli Radio ..	561
HMO	b. Eretza Mendi ..	713	ICP	c. Derna Radio ..	543
HMP	b. Gorbea Mendi ..	714	ICQ	c. Palermo Radio ..	561
HMQ	b. Igotz Mendi ..	714	ICR	c. S. Cataldo Bari ..	561
HMR	b. Iluntzar Mendi ..	714	ICS	c. Capo Sperone Radio ..	559
HMS	b. Jata Mendi ..	715	ICT	c. Spezia ..	561
HMT	b. Ordunte Mendi ..	717	ICV	c. Taranto ..	561
HMU	b. Armuru ..	712	ICU	c. Vittoria Radio ..	562
HMU	b. Marie Teresa ..	716	ICW	c. Tobruk Radio ..	543
HMV	b. Unbe Mendi ..	719	ICW	c. Asmara ..	546
HMW	b. Upo Mendi ..	719	ICX	c. Rodi ..	544
HMX	b. Urkiola Mendi ..	719	ICY	c. Massaua ICX ..	546
HMY	b. Urko Mendi ..	719	ICZ	c. Assab Radio ..	546
HMZ	b. Ibai Patxo ..	714	ICZ	c. Venezia Radio ..	561
HNA	b. Rita HNA ..	717	IDA	c. Stampalia ..	544
HNB	b. Achuri ..	711	IDB	c. Saseno Radio ..	561
HNC	b. Arnus ..	712	IDC	c. Stromboli Radio ..	561
HND	b. Sendeja ..	717	IDF	c. Santa Maria di Leuca ..	561
HNE	b. Begonia No. 5 ..	712	IDG	c. Otranto Radio ..	561
HNF	b. Villa Manrique ..	719	IDH	c. Crotone Radio ..	560

PAGE			PAGE
560	IGO	b. Eridano	671
560	IGP	b. Misurata	674
559	IGQ	b. Ciclope	670
561	IGR	b. Ammiraglio Mag-	
560		naghi	668
561	IGS	b. Capitano Verri ..	670
561	IGT	c. Torino	561
676	IGU	b. Zenson	678
674	IGU	b. Carlo Alberto ..	670
676	IGV	b. S. Giorgio II ..	676
669	IGV	c. Treviso	561
672	IGX	b. Eritrea	671
671	IGY	b. Marco Pola ..	673
676	IGZ	b. Sebastiano Caboto	677
676	IHA	b. Andrea Doria ..	668
673	IHB	b. Duilio	671
672	IHC	b. Dante Alighieri IHC	671
676	IHD	b. Conte di Cavour ..	671
675	IHE	b. Giulio Cesare IHE	673
669	IHF	b. Vettor Pisani ..	677
668	IHG	b. Italia IHG	673
674	IHH	b. Dandolo	671
678	IHK	b. Re Umberto	676
671	IHL	b. Sicilia IHL	677
670	IHM	b. Sardegna IHM ..	676
677	IHN	b. Vittorio Emanuele	678
675	IHO	b. Napoli	674
674	IHP	b. Roma IHP	676
673	IHQ	b. Regina Elena ..	676
671	IHR	b. Pisa	675
677	IHT	b. S. Marco	676
669	IHU	b. S. Giorgio IHU ..	676
673	IHV	b. Ammiraglio Di Saint	
671		Bon	668
670	IHW	b. Emanuele Filiberto	671
669	IHX	b. Ercole	671
669	IHY	b. Varese	677
673	IHZ	b. Francesco Ferruccio	672
671	IIA	b. Ardito	669
672	IIB	b. Ardente	669
677	IIC	b. Audace	669
560	IID	b. Animoso	668
671	IIE	b. Alpino	668
677	IIF	b. Giannutri	672
668	IIG	b. Artigliere	669
671	IIH	b. Bersagliere	669
561	III	b. Borea	669
675	IIJ	b. Carabiniere ..	670
562	IIK	b. Corazziere	671
669	IIL	b. Dardo	671
668	IIM	b. Espero	671
677	IIN	b. Euro	671
677	IIO	b. Fuciliere	672
670	IIP	b. Fulmine	672
559	IIQ	b. Garibaldino ..	672
677	IIR	b. Granatiere	673
672	IIS	b. Indomito	673
672	IIT	b. Insidioso	673
669	IIU	b. Intrepido	673
668	IIV	b. Impavido	673
672	IIW	b. Aquilone	669
669	IIX	b. Irrequieto	673
670	IYY	q. Lampo IYY	673
671	IIZ	b. Lanciere	673
670	IJA	b. Nembo	674
677	IJB	b. Ostro	675
678	IJC	b. Pontiere	675
560	IJD	b. Strale	677
672	IJE	b. Zeffiro	678

		PAGE			PAGE
IJF	b. Ascaro ..	669	ILV	b. Monviso ILV ..	674
IJG	b. F. Nullo ..	672	ILW	b. Monterosa ..	674
IJH	b. A. Mosto ..	668	ILX	b. Fratelli Bandiera ..	672
IJI	b. Europa IJI ..	672	ILY	b. Ansaldo 4 ..	669
IJJ	b. R. Pilo ..	676	ILZ	b. Brescia ILZ ..	669
IJK	b. G. Abba ..	672	IMC	b. Cariddi ..	670
IJL	b. I. Nievo ..	673	IMD	b. Amalfi ..	668
IJM	b. S. Schiaffino ..	677	IME	b. S. Rossore ..	676
IJN	b. P. Bronzetti ..	675	IMF	b. Cogne ..	671
IJO	b. G. Missori ..	673	IMG	b. Giove ..	672
IJP	b. Aquila ..	669	IMI	b. Silvio Pellico ..	677
IJQ	b. Sirtori ..	677	IMJ	b. Catania ..	679
IJR	b. Nibbio ..	675	IMK	b. Arnaldo da Brescia ..	669
IJS	b. Sparviero ..	677	IML	b. Gonzaga ..	673
IJT	b. Falco ..	672	IMM	b. Montenegro ..	674
IJU	b. F. Stocco ..	672	IMO	b. Marina O IMO ..	674
IJV	b. G. La Masa ..	673	IMP	b. Paraguay ..	675
IJW	b. G. Carini ..	672	IMQ	b. Albano ..	668
IJX	b. Bertani ..	669	IMR	b. Trasimeno ..	677
IJZ	b. N. Fabrizi ..	675	IMS	b. S. Giorgio IMS ..	676
IKA	b. Tobruk ..	677	IMT	b. Tirreno ..	677
IKB	b. Medici ..	674	IMU	b. Scivia ..	676
IKC	b. Prometeo ..	675	IMV	b. Favignana ..	672
IKD	b. Quarto ..	675	IMW	b. Nemi ..	675
IKE	b. Marsala ..	674	IMX	b. Tolemaide ..	677
IKF	b. Nino Bixio ..	675	IMY	b. Angelo Brunetti ..	668
IKG	b. Etna IKG ..	671	IMZ	b. Vega ..	677
IKH	b. Libia ..	673	INA	b. Montello ..	674
IKI	b. Elba - IKI ..	671	INB	b. Nilos ..	675
IKJ	b. Piemonte IKJ ..	675	IND	b. Cesare Battisti ..	670
IKK	b. Puglia ..	675	IND	b. Oldeburgo ..	675
IKL	b. Basilicata ..	669	INE	b. Città di Trieste ..	671
IKM	b. Campania IKM ..	670	INF	b. Orione 2 ..	675
IKN	b. Calabria IKN ..	670	ING	b. Capri ..	670
IKO	b. Lombardia ..	673	INH	b. Marco Minghetti ..	673
IKP	b. Etruria IKP ..	671	INI	b. Regina d'Italia ..	675
IKQ	b. Liguria ..	673	INJ	b. Pola ..	670
IKR	b. Agordat ..	668	INK	b. Cagliari ..	677
IKS	b. Coatic ..	671	INL	b. Sicilia INL ..	674
IKT	b. Irido ..	673	INM	b. Milano ..	668
IKU	b. Goito ..	673	INN	b. Angelo Toso ..	675
IKV	b. Tripoli ..	677	INO	b. Primula INO ..	671
IKW	b. Atlante ..	669	INP	b. Città di Tripoli ..	671
IKX	b. Minerva IKX ..	674	INQ	b. Etruria INQ ..	676
IKY	b. Partenope ..	675	INR	b. Roma INR ..	676
IKZ	b. Montebello ..	674	INS	b. Sardegna INS ..	675
ILA	b. Bolsena ..	669	INT	b. Porto di Alessan- dretta ..	675
ILB	b. Bayonne ..	669	INU	b. Theodo ..	677
ILC	b. Ancona ..	668	INV	b. Porto di Savona ..	675
ILD	b. Monte Bianco ..	674	INW	b. Entella ..	671
ILE	b. Nettuno ..	675	INX	b. Piemonte INX ..	675
ILF	b. Alberto Cavalletto ..	668	INY	b. Po ..	673
ILG	b. Crema ..	671	INZ	b. Ischia ..	676
ILI	b. Capodimonte ..	670	IOA	b. Rovigno ..	675
ILI	b. Primula ILI ..	675	IOB	b. Presidente Wilson ..	671
ILI	b. Cleopatra ..	671	IOC	b. Elba IOC ..	669
ILJ	b. Bastia ..	669	IOD	b. Battinin Accame ..	669
ILK	b. Carlo Pisacane ..	670	IOF	b. Antonietta Accame ..	675
ILL	b. Lampo ILL ..	673	IOG	b. Principessa Jolanda ..	668
ILM	b. Pesaro ..	675	IOH	b. Affinità ..	668
ILN	b. Majella ..	673	IOI	b. Amista ..	670
ILO	b. Moncenisio ILO ..	674	IOJ	b. Chile ..	673
ILP	b. Belluno ..	669	IOK	b. Guiseppina Hardi ..	669
ILQ	b. Wardha ..	678	IOJ	b. Bulzaneto ..	668
ILR	b. Cervino ..	670	IOL	b. Alacrità ..	668
ILR	b. Tatra ILR ..	677	IOM	b. Albania ..	668
ILS	b. Splendor ..	677	ION	b. Ammiraglio Bettolo ..	675
ILT	b. Ansaldo 5 ..	669		b. Nitor ..	
ILU	b. Ferrara ..	672			

100
10P
10Q
10R
10T
10U
10V
10W
10X
10Y
10Z
IPA
IPB
IPC
IPD
IPE
IPF
IPG
IPH
IPI
IPJ
IPK
IPL
IPN
IPO
IPP
IPQ
IPR
IPS
IPT

IPU
IPV
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IPY
IPZ
IQV
IQW
IQX
IQZ
IRC

IRF
IRG
IRM
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ISB
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ISE
ISF
ISG
ISH
ISI
ISJ
ISM
ISN
ISO
ITA
ITB
ITC
ITD
ITE
ITF
ITG
ITH
ITJ
ITK
ITL

PAGE			PAGE
669	ITM	b. Agios Georgios ..	668
670	ITN	b. Sori	677
671	ITO	b. Armando	669
670	ITP	b. Argentina	669
675	ITQ	b. Francesca	672
669	ITT	b. Laura	673
675	ITU	b. Umbria	677
668	ITV	b. Ninfa	675
668	ITW	b. Castelporziano ..	670
669	ITX	b. Belvedere	669
673	ITY	b. Josto	673
671	ITZ	b. Circe	670
677	ITZ	b. Marzocco	674
673	IUA	b. Garibaldi IUA ..	672
673	IUB	b. Clio	671
676	IUB	b. S. Marco	676
672	IUC	b. Vittorio Veneto ..	678
668	IUD	b. Goffredo Mameli ..	673
668	IUE	b. Valdarno	677
673	IUF	b. Juno	673
675	IUH	b. Dante Alighieri IUH	671
674	IUI	b. Città di Bengasi ..	670
673	IUJ	b. Vindobona	677
677	IUK	b. Angelo Scarsellini ..	668
670	IUL	b. Legnano	673
677	IUN	b. Nicolo	675
672	IUO	b. Vallarsa	677
677	IUP	b. Tirol	677
674	IUQ	b. Calimeris	670
	IUR	b. Ansaldo 3	669
672	IUS	b. Tortona	677
672	IUT	b. Padova	675
673	IUU	b. Espero	671
676	IUV	b. Giuseppe Verdi ..	673
675	IUW	b. Ugo Bassi	677
674	IUX	b. Loredano	673
561	IUY	b. Aster	669
559	IUZ	b. Barbarigo	669
561	IVA	b. Aurania	669
561	IVB	b. Luigino Accame ..	673
	IVC	b. Scillin	676
559	IVD	b. Titania	677
559	IVE	b. Nazari Sauro	674
546	IVF	b. Marte	674
561	IVG	b. Eugenio Cantoni ..	671
546	IVI	b. Ansaldo S. Georgio I	669
559	IVJ	b. Montecristo	674
558	IVK	b. Hungaria	673
559	IVL	b. Narenta	674
559	IVM	b. Ombla	675
559	IVN	b. Marina IVN	674
559	IVO	b. Kerka	673
559	IVP	b. Cetina	670
559	IVQ	b. Cannosa	670
559	IVR	b. Salina	676
559	IVS	b. Meran	674
558	IVU	b. Melpomene	674
559	IVV	b. M. Verderame	674
677	IVW	b. Scampolo	676
669	IVX	b. Piave IVX	675
671	IVY	b. Helouan	673
671	IWA	b. Salvatore	676
676	IWB	b. Ida	673
676	IWC	b. Agatocle	668
674	IWD	b. Francesco Ciampa ..	672
674	IWE	b. Città di Palermo ..	670
670	IWF	b. Patras	675
671	IWG	b. Alberto Treves ..	668
670	IWH	b. Stromboli	677

		PAGE			PAGE
IWI	b. Caprera	670	IZJ	b. Racconigi	675
IWJ	b. Etna IWJ	671	IZK	b. Sestri	677
IWK	b. Maddalena	673	IZM	b. Rossignano	676
IWK	b. Zovetto	678	IZN	b. Roverbella	676
IWL	b. Antonio	669	IZO	b. Vulcano IZO	678
IWM	b. Columbia IWM	671	IZP	b. Esperia IZP	671
IWO	b. Speranza	677	IZQ	b. Vesuvio	677
IWO	b. Giovanni C.	672	IZR	b. Leopoli	673
IWR	b. Mariquita	674	IZS	b. Cuzco	671
IWS	b. Giuditta	672	IZT	b. Duca d'Aosta	671
IWT	b. Virginia	677	IZV	b. Re Vittorio	676
IWU	b. Eliopoli	671	IZW	b. Febo	672
IWV	b. Pietro Calvi	675	IZX	b. Esperia IZX	671
IWW	b. Moncalieri	674	IZY	b. Sirte	677
IWX	b. Città di Porto Maurizio	670	IZZ	b. Duca degli Abruzzi	671
IWY	b. Vittorio	677	ICCM	b. Elettra	671
IWZ	b. Alcazar	668	JAB	b. Yoko Maru	695
IWZ	b. Gablonz	672	JAC	b. America Maru	679
IXA	b. Palacky	675	JAE	b. Yaye Maru	695
IXB	b. Alcana	668	JAF	b. Yuri Maru	696
IXC	b. Sowwell	677	JAH	b. Italy Maru	683
IXD	b. Cavi	670	JAI	b. Aki Maru	678
IXG	b. Andrea	668	JAK	b. Muroran Maru	688
IXH	b. Colomba	671	JAL	b. Alaska Maru	678
IXI	b. Giuseppe Beraldo	673	JAQ	b. Kaigen Maru	684
IXJ	b. Minerva IXJ	674	JAR	b. Amur Maru	679
IXK	b. Giglio	672	JAT	b. Atsuta Maru	679
IXL	b. Livietta	673	JAV	b. Koshun Maru	687
IXM	b. Michelangelo	674	JAW	b. Awa Maru	679
IXN	b. Rodi	676	JAY	b. Anyo Maru	679
IXO	b. Bagnoli	669	JAZ	b. Amazon Maru	679
IXP	b. Ansaldo 2	669	JBA	b. Meichi Maru	687
IXQ	b. Polynesia	675	JBB	b. Shinbu Maru	691
IXR	b. Giulio Cesare IXR	673	JBC	b. Calcutta Maru	680
IXT	b. Moncenisio IXT	674	JBD	b. Ataka Maru	679
IXU	b. Baron Call	669	JBE	b. Capetown Maru	680
IXV	b. Ansaldo 1	669	JBF	b. Kaifuku Maru	684
IXX	b. Rosario	676	JBG	b. Bingo Maru	679
IXY	b. Agnello Ciampa	668	JBH	b. Kureha Maru	687
IYA	b. Veniero	677	JB1	b. Miikesan Maru	688
IYB	b. Rodosto	676	JB1	b. Horaisan Maru	683
IYC	b. Orseolo	675	JBK	b. Sakigake Maru No. 3	690
IYD	b. Tebe	677	JBL	b. Tsurugisan Maru	694
IYE	b. Berenice	669	JBM	b. Azuma Maru	679
IYF	b. Toca	677	JBN	b. Genmei Maru	681
IYG	b. Bucovina	670	JBO	b. Hidson Maru	682
IYH	b. Roma 2	676	JBP	b. Alps Maru	678
IYI	b. Indiana	673	JBQ	b. Kofuku Maru JBQ	686
IYJ	b. Rovato	676	JBR	b. Siberia Maru	691
IYK	b. Nicolaos	675	JBS	b. Azumasan Maru	679
IYL	b. Fert	672	JBT	b. Tosa Maru	693
IYM	b. Principessa Mafalda	675	JB1	b. Yubari Maru	695
IYO	b. Metlaoni	674	JBV	b. Ikomasan Maru	683
IYQ	b. Compagnia IYQ	670	JBX	b. Hakushika Maru	681
IYR	b. Re d'Italia	675	JBY	b. Yoshida Maru No. 2	695
IYS	b. Tomaso di Savoia	677	JCA	b. Meikai Maru	687
IYT	b. Taormina	677	JCB	b. Akita Maru	678
IYU	b. Principe di Udine	675	JCC	b. Chicago Maru	680
IYW	b. Maria C.	674	JCD	b. Canada Maru	680
IYX	b. Elettrico	671	JCE	b. Celebes Maru	680
IYY	b. Resurrezione	676	JCF	b. Hanasaki Maru	682
IYZ	b. Caserta	670	JCG	b. Nanking Maru	688
IZA	b. America	668	JCH	b. Tensho Maru	693
IZB	b. D'Aosta	671	JCI	b. Nagano Maru	688
IZD	b. Procida	675	JCK	b. Keishin Maru	685
IZF	b. Coltano	671	JCL	b. Borneo Maru JCL	680
IZH	b. Savoia 2	676	JCN	b. Tenkai Maru	693
IZI	b. Italia IZI	673	JCO	b. Oridono Maru	689
			JCP	b. Yamagata Maru	694

PAGE			PAGE
683	JGB	b. Asahi	679
562	JGC	b. Mikasa	628
695	JGD	b. Hizen	688
691	JGF	b. Katori	685
691	JGG	b. Kashima	685
692	JGJ	b. Satsuma JGJ	690
695	JGK	b. Aki	678
562	JGL	b. Nagato	688
695	JGM	b. Settsu	690
978	JGN	b. Fusu	681
688	JGO	b. Yamashiro	694
691	JGP	b. Ise	683
681	JGQ	b. Ikoma	683
693	JGR	b. Kurama	687
683	JGT	b. Ibuki	683
690	JGU	b. Kongo	686
679	JGV	b. Hiei	682
688	JGW	b. Kirishima	685
691	JGX	b. Haruna	682
687	JGY	b. Hiuga	682
689	JHA	b. Konan Maru	686
683	JHB	b. Harbin Maru	682
678	JHD	b. Genchu Maru	681
683	JHG	b. Tencho Maru	693
686	JHJ	c. Horomushiro Radio	562
680	JHK	b. Kifuku Maru	685
685	JHL	b. Raifuku Maru	689
689	JHM	b. Hofuku Maru	683
684	JHN	b. Hongkong Maru	683
695	JHO	b. Yeboshi Maru	695
682	JHP	b. Kibi Maru No. 6	685
692	JHR	b. Hirano Maru	682
691	JHS	b. Kimi Maru	685
679	JHT	b. Keifuku Maru	685
689	JHU	b. Bombay Maru	679
686	JHV	b. Taiho Maru	692
687	JHW	b. Hawaii Maru	682
687	JHY	b. Hayatori Maru	682
684	JHZ	b. Chifuku Maru	680
681	JIB	b. Inaba Maru	683
695	JIC	b. Batavia Maru	679
689	JIF	b. Taigi Maru	691
681	JIG	b. Kotsu Maru	687
690	JIH	b. Yoshida Maru No. 1	695
694	JIL	b. Iki Maru	683
688	JIN	b. Genyei Maru	681
690	JIP	b. Kaian Maru	684
695	JIQ	b. Jinsho Maru	684
683	JIR	b. Madras Maru	687
687	JIV	b. Heyin Maru	682
678	JIW	b. Yone Maru	695
684	JIX	b. Yomei Maru	695
681	JJC	c. Funabashi Radio	562
685	JKA	b. Kamo Maru	684
692	JKB	b. Kobe Maru	686
562	JKC	b. Chefoo Maru	680
686	JKD	b. Koyo Maru	687
681	JKF	b. Kumaro Maru	687
682	JKG	b. Kagi Maru	684
686	JKH	b. Karachi Maru	685
589	JKI	b. Sakaki Maru	690
583	JKJ	b. Kamiji Maru	684
587	JKK	b. Kaikyu Maru	684
592	JKL	b. Koma Maru	686
579	JKM	c. Komonto	562
588	JKN	b. Kitano Maru	685
592	JKO	b. Kayo Maru	685
593	JKP	b. Heimei Maru	682
590	JKQ	b. Durban Maru	681

		PAGE			PAGE
JKR	b. Katori Maru	685	JRJ	b. Kasuga	685
JKS	b. Kosai Maru	686	JRK	b. Nisshin	689
JKT	b. Kasado Maru	685	JRL	b. Aso	679
JKU	b. Kunajiri Maru	687	JSA	c. Rasajima	563
JKV	b. Fukuyo Maru	681	JSB	c. Shogetsu	563
JKX	b. Kashima Maru	685	JSD	b. Sado Maru	690
JKY	b. Kiyo Maru	686	JSH	b. Shinyo Maru JSH	691
JLA	b. Kuma	687	JSJ	b. Scotland Maru	690
JLB	b. Chitose	681	JSK	b. Shiragi Maru	691
JLC	b. Tsugaru	693	JSL	b. Genoa Maru	681
JLF	b. Tone	693	JSM	c. Shiomisaki Radio	563
JLG	b. Chikuma	680	JSN	b. Shinano Maru	690
JLJ	b. Hirato	682	JSP	b. Singapore Maru	691
JLK	b. Yahagi	694	JSQ	b. Shunko Maru	691
JLL	b. Suma	691	JSS	c. Shoseito	563
JLM	b. Akashi	678	JST	b. Seattle Maru	690
JLN	b. Niitaka	689	JSU	b. Suwa Maru	691
JLO	b. Tsushima	694	JSX	c. Shimotsui Radio	563
JLP	b. Tenryu	693	JSY	b. Seiyō Maru	690
JLQ	b. Tatsuta	693	JSZ	b. Shidzuoka Maru	690
JMA	b. Tsushima Maru JMA	694	JTA	b. Tacoma Maru	691
JMB	b. Hakodate Maru	681	JTB	b. Tamba Maru	692
JMC	b. Boston Maru	680	JTC	b. Taichu Maru	691
JMP	c. Mokpo	563	JTG	b. Tango Maru	692
JMQ	b. Mishima Maru	688	JTL	b. Tsushima Maru JTL	694
JMR	b. Manila Maru	687	JTM	b. Taisei Maru	692
JMX	b. Mexico Maru	688	JTN	b. Tainan Maru	692
JMZ	c. Maizuru Radio	562	JTP	b. Tamatsu Maru	692
JNA	b. Kanagawa Maru	685	JTQ	b. Tokushima Maru	693
JNC	b. Yonan Maru	695	JTS	c. Tsunoshima Radio	563
JND	b. Neisei Maru	689	JTU	b. Tokuyama Maru	693
JNL	b. Nikko Maru	689	JTV	b. Tsurushima Maru	694
JNP	b. Nippon Maru	689	JTX	b. Toyama Maru	693
JOC	c. Otchishi Radio	563	JTY	b. Tenyo Maru	693
JOG	b. Ogasawara Maru	689	JUC	b. Fuji	681
JON	b. Okinawa Maru	689	JUD	b. Iwami	683
JOS	c. Osezaki Radio	563	JUG	b. Suwo	691
JOT	b. Otori Maru	689	JUK	b. Okinoshima	689
JOY	b. Choyo Maru	681	JUL	b. Mishima	688
JOZ	b. Rozan Maru	689	JUN	b. Itsukushima	683
JPA	b. Tsuruga Maru	694	JUO	b. Hashidate	682
PB	b. Borneo Maru JPB	680	JUP	b. Chiyoda	681
JPC	b. Kawachi Maru	685	JUQ	b. Akitsushima	678
JPF	b. Toba Maru	693	JUR	b. Wakamiya	694
JPG	b. Kaga Maru	684	JUT	b. Manshu	687
JPH	b. Haruna Maru	682	JUU	b. Komahashi	686
JPJ	b. Tajima Maru	692	JUV	b. Karasaki	685
JPK	b. Hakata Maru	681	JUX	b. Yamato	694
JPL	b. Liverpool Maru	687	JUY	b. Musashi	688
JPM	b. Panama Maru	689	JWB	b. Chihaya	680
JPN	b. Portsaid Maru	689	JWC	b. Yodo	695
JPO	b. Iyo Maru	683	JWD	b. Mogami	688
JPP	b. Persia Maru	689	JWF	b. Uji	694
JPQ	b. Tottori Maru	693	JWG	b. Sumida	691
JPR	b. Kamakura Maru	684	JWJ	b. Fushimi	681
JPS	b. Sanuki Maru	690	JWK	b. Toba	693
JPT	b. Toyohashi Maru	693	JWL	b. Saga JWL	690
JPU	b. Tatsuno Maru	692	JYA	b. Atagosan Maru	679
JPV	b. Chosen Maru	681	JYC	b. Oura Maru	689
PW	b. Wakasa Maru	694	JYE	b. Yubae Maru	695
JPX	b. Buyo Maru	680	JYF	b. Nankai Maru	688
JPY	b. Shinyo Maru JPY	691	JYG	b. Amagisan Maru	679
JPZ	b. Tenpaisan Maru	693	JYH	b. Yokohama Maru	695
JRA	b. Asama	679	JYI	b. Yayoi Maru	695
JRB	b. Tokiwa	693	JYJ	b. Mandasan Maru	687
JRC	b. Yakumo	694	JYK	b. Kinkasan Maru	685
JRD	b. Adzuma	678	JYL	b. Korea Maru	686
JRF	b. Iwate	683	JYM	b. Tsuyama Maru	694
JRG	b. Idzumo	683	JYN	b. Somidono Maru	691

PAGE			PAGE
693	KEQ	c. Port Walter ..	521
683	KER	c. Kereinik ..	583
686	KER	b. H.M. Flagler ..	854
689	KES	b. S. Jacinto ..	918
694	KET	c. Bolinas ..	592
681	KEU	b. S. V. Harkness ..	917
563	KEW	b. Harstele ..	852
679	KEX	b. Josiah Macy ..	858
693	KEY	c. Cape Edwards ..	519
691	KEZ	b. Brazos ..	825
680	KFA	b. City of Columbus ..	831
683	KFB	b. City of Atlanta ..	831
553	KFC	b. Macona ..	871
553	KFD	b. Lake Janet ..	867
	KFE	b. Wynooche ..	931
553	KFF	b. Frieda ..	847
553	KFG	b. Feltore ..	845
554	KFH	b. West Ashawa ..	925
554	KFI	b. I. D. Fletcher ..	856
554	KFJ	b. City of Augusta ..	831
	KFK	b. City of Savannah ..	832
553	KFL	b. Maryanne ..	873
553	KFM	b. Mahnet ..	871
553	KFN	b. Tormentor ..	921
	KFO	b. Buccaneer ..	825
553	KFP	b. Nacooches ..	878
	KFQ	b. Owego ..	884
553	KFS	b. Benjamin Brewster ..	822
554	KFT	b. Tasco ..	919
553	KFU	c. Leuto ..	598
554	KFV	b. Boringuen ..	824
887	KFY	b. City of Montgomery ..	831
828	KFZ	b. City of St. Louis ..	832
595	KGA	b. Coamo ..	832
828	KGB	b. Baganito ..	820
828	KGD	b. Suruga ..	916
834	KGE	b. Westwego ..	928
885	KGH	c. Hollister, California ..	597
853	KGI	c. Oakland, California ..	603
814	KGJ	b. S. Juan KGJ ..	918
918	KGK	b. Edgar F. Luckenbach ..	842
819			
869	KGL	b. Dochra ..	839
872	KGM	b. Mexicano KGM ..	875
844	KN	c. Portland, Oregon ..	
		KGN	603
603	KGO	c. Underwood, Washington ..	605
896			
869	KGP	b. Ponce ..	887
899	KGQ	b. Edward Luckenbach ..	843
921	KGR	b. Cambridge KGR ..	827
869	KGS	b. Senator Bailey ..	897
521	KGT	b. J. L. Luckenbach ..	858
924	KGU	b. Kanakanak ..	859
932	KGV	b. Frederick Luckenbach ..	847
887			
895	KGW	b. Isabela ..	856
833	KGX	b. Sewalls Point ..	898
925	KGY	b. Pathfinder KGY ..	885
853	KGZ	b. Julia Luckenbach ..	859
892	KHA	c. Larsen Bay ..	520
881	KHB	c. Kvichak, Alaska ..	520
874	KHC	c. Chignik ..	519
815	KHD	b. Stanwood ..	903
918	KHE	b. Lake Silver ..	867
857	KHF	c. Snag Point ..	522
833	KHG	c. Clarks Point ..	519
854	KHI	c. Isabel de Basilan ..	575
868	KHK	c. Wahiawa ..	556

		PAGE			PAGE
KHL	c. Lahaina ..	556	KKJ	b. West Celeron ..	925
KHM	c. Lihue ..	556	KKL	b. Alba (El) ..	815
KHN	c. Kawaihae ..	556	KKM	b. Momus ..	876
KHO	c. Kaunakakai ..	556	KKN	b. Norte (El) ..	880
KHP	b. Mangore ..	871	KKO	b. Excelsior ..	844
KHQ	c. Phoenix, Arizona ..	603	KKP	b. Mahanna ..	871
KHR	b. J. W. Van Dyke ..	859	KKQ	b. Sud (El) ..	916
KHS	b. H. C. Folger ..	853	KKR	b. Creole ..	836
KHT	c. Naknek KHT ..	521	KKS	b. Siglo (El) ..	898
KHU	b. Lake Ogden ..	867	KKT	b. Cid (El) ..	831
KHV	b. Lake Jessup ..	867	KKU	b. Mundo (El) ..	877
KHW	b. Lake Charles ..	863	KKV	b. Oriente (El) ..	883
KHY	b. K. I. Luckenbach ..	861	KKW	b. Valle (El) ..	922
KHZ	b. Mystic ..	878	KKX	b. Occidente (El) ..	882
KIA	b. Ardmore ..	818	KKY	b. Dia (El) ..	838
KIB	b. Muskogee ..	877	KKZ	b. Rio (El) ..	892
KIC	b. Standard KIC ..	903	KLA	b. Pastores ..	885
KID	b. Matinicoek ..	873	KLB	b. Buttonwood ..	826
KIG	b. Pioneer KIG ..	887	KLC	b. Calamares ..	827
KIH	b. Corning ..	834	KLD	b. Fort Worth ..	847
KII	b. Evangeline KII ..	844	KLE	b. Zacapa ..	931
KIJ	b. Acme ..	814	KLF	b. Metapan ..	874
KIK	b. Westerner ..	926	KLG	b. S. Marta ..	918
KIL	b. Hewitt ..	854	KLH	b. Saramaca ..	896
KIM	c. Latouche, Alaska ..	520	KLI	b. Suriname ..	916
KIN	b. Patrol KIN ..	885	KLJ	b. Beatrice ..	822
KIO	b. Brynhilda ..	825	CLK	b. Craster Hall ..	835
KIP	b. General W. C. Gorgas ..	849	KLL	c. Thompson Falls ..	605
KIQ	b. Astral ..	819	KLM	b. Bantuy ..	821
KIR	b. Peerless KIR ..	885	KLN	b. Abbeville ..	814
KIS	c. Marshall, Alaska ..	521	KLO	b. S. Rosalia ..	918
KIT	b. Tiger ..	920	KLP	c. Lewistown, Montana ..	598
KIU	b. Western Hero ..	926	KLQ	c. Great Falls, Montana ..	597
KIW	c. Victor, Colorado ..	605	KLR	b. Crofton Hall ..	836
KIX	c. Denver, Colorado ..	594	KLS	c. Los Angeles, California ..	601
KIZ	c. Brooks, Alaska ..	519	KLT	b. Howick Hall ..	855
KJA	c. Jualin ..	520	KLU	b. Charlton Hall ..	830
KJB	b. Bushong ..	826	KLV	b. S. Mateo ..	918
KJC	b. Glorieta ..	849	KLW	c. Port Althorp ..	521
KJC	b. Ocones ..	882	KLX	b. Kermanshah ..	860
KJD	b. North Land KJD ..	881	KLY	b. Deepwater ..	837
KJE	b. Norlina ..	880	KLZ	b. Speedwell ..	903
KJF	b. Carolinian ..	828	KMA	b. Alliance ..	816
KJG	b. Eurana ..	844	KMB	b. Amolco ..	817
KJH	b. West Wind ..	928	KMC	b. Vigo KMC ..	923
KJI	b. Satsuma KJI ..	896	KMD	b. Cristobal ..	836
KJK	c. King Cove ..	520	KME	b. Pennant ..	886
KJL	c. False Pass ..	519	KMF	c. Egegik ..	519
KJM	b. West Cherow ..	925	KMG	c. Ekluk, Alaska ..	519
KJN	b. J. A. Bostwick ..	857	KMH	b. Panama KMH ..	884
KJP	b. Joseph R. Parrott ..	858	KMI	b. Tivives ..	920
KJQ	c. Craftonville ..	594	KMJ	b. Matoa ..	873
KJS	b. North Star ..	881	KMK	c. Naknek KMK ..	521
KJT	b. Waban ..	923	KML	c. Lockanok, Alaska ..	521
KJU	b. Bacoi ..	820	KMM	b. Panuco KMM ..	885
KJV	b. West Haven ..	927	KMN	b. Butte Montana ..	593
KJW	b. O. T. Waring ..	884	KMO	b. Augusta ..	819
KJX	b. Westland ..	927	KMP	c. Bristol Bay, Alaska ..	519
KJY	b. West Point ..	928	KMQ	b. Sherman KMQ ..	898
KJZ	b. Chincha ..	831	KMR	c. Khartoum ..	583
KKA	c. Yakutat, Alaska ..	522	KMR	b. Wellington KMR ..	925
KKB	b. Sol (El) ..	899	KMS	b. Ancon ..	817
KKC	b. Chalmette ..	829	KMT	c. L'bbyville, Alaska ..	521
KKD	b. Comus ..	833	KMU	c. Ugashik ..	522
KKE	b. Topila ..	921	KMV	b. Advance ..	815
KKF	b. Torres ..	921	KMW	c. Akutan ..	518
KKG	b. Almirante (El) ..	816	KMX	b. Colon KMX ..	833
KKH	b. Captain KKH (El) ..	828	KMY	b. Holden Evans ..	854
KKI	b. Kilkenny KKI ..	861			

PAGE			PAGE
848	KPY	b. Jane Palmer ..	857
839	KPZ	b. Governor Brooks ..	850
869	KQA	b. Harry Farnum ..	852
833	KQB	b. Walter Hardcastle ..	924
887	KQC	b. Cretan ..	836
832	KQD	b. Dorchester ..	839
930	KQE	b. Essex KQE ..	844
824	KQF	b. Gene Crawley ..	848
825	KQG	b. Gloucester KQG ..	849
838	KQH	b. Howard KQH ..	855
857	KQI	b. Keresaspa ..	860
872	KQJ	b. Juniata KQJ ..	859
879	KQK	b. Kershaw ..	860
875	KQL	b. Oakley C. Curtis ..	882
929	KQM	b. Merrimack ..	874
921	KQN	b. Nantucket ..	878
837	KQO	b. Ontario ..	883
847	KQP	b. Kerlew ..	860
875	KQQ	b. Quantico ..	889
916	KQR	b. Grecian ..	850
875	KQS	c. Washington Bay, Alaska ..	522
836	KQT	b. Wyoming KQT ..	931
836	KQU	b. Ruth E. Merrill ..	893
892	KQV	b. Samuel Faunce ..	896
917	KQW	b. Dorothy Palmer ..	839
847	KQX	b. Persian ..	886
814	KQY	b. Edward J. Lawrence	843
852	KQZ	b. City of Rome ..	832
888	KRA	b. Freeport Sulphur No. 1 ..	847
857	KRB	b. Governor Cobb ..	850
833	KRC	b. Camden KRC ..	827
829	KRD	b. Belfast ..	822
871	KRF	b. Ranson B. Fuller	891
849	KRG	b. Freeport Sulphur No. 2 ..	847
887	KRH	b. City of Bangor ..	831
815	KRI	b. City of Rockland ..	832
917	KRJ	b. Relief ..	891
877	KRK	b. Gargoyle ..	848
921	KRL	b. Kiowa ..	861
817	KRM	b. Resolute ..	891
862	KRN	b. Calvin Austin ..	827
898	KRO	b. Bramell Point ..	824
879	KRP	b. Rescue ..	891
867	KRQ	b. Manitowoc ..	871
859	KRR	b. Olean ..	883
920	KRS	b. Paulsboro ..	885
520	KRT	b. S. Francis ..	917
873	KRU	b. Fordonian ..	846
853	KRV	b. Governor Dingley ..	850
853	KRW	b. Sierra KRW ..	898
875	KRX	b. Rama ..	890
929	KRY	b. Santino ..	896
605	KRZ	b. Sudbury KRZ ..	916
848	KSA	b. Standard II ..	903
848	KSAB	b. J. E. O'Neil ..	858
903	KSC	b. Chinampa ..	831
876	KSC	b. Cushing KSC ..	836
929	KSF	b. Finland ..	845
921	KSG	b. Baton Rouge ..	821
837	KSH	b. Kroonland ..	861
916	KSI	b. H. H. Rogers ..	854
837	KSJ	b. Security ..	897
814	KSK	b. Caddo ..	827
922	KSL	b. Louisville KSL ..	870
899	KSM	b. Philadelphia KSM	887
827	KSN	b. New York KSN ..	880

		PAGE			PAGE
KSO	b. S. Paul KSO	918	KVJ	b. Walter D. Munson	924
KSP	b. Caloria	827	KVK	b. Cherokee	830
KSQ	b. Charles Pratt	830	KVL	b. Lenape	869
KSR	b. Bayway	821	KVM	b. Mohawk KVM	875
KST	b. Princeton	888	KVN	b. Tanamo	919
KSU	b. Somerset KSU	899	KVO	b. Sagua KVO	895
KSV	b. Standard Arrow	903	KVP	b. Charles Braley	829
KSW	b. Royal Arrow	893	KVQ	b. Albert Watts	816
KSX	b. Sylvan Arrow	917	KVR	b. Elinor	843
KSX	b. Broad Arrow	825	KVS	b. Gulf Queen	851
KSZ	b. Cora F. Cressy	834	KVT	b. H. C. Cadmus	853
KTA	b. Larimer	869	KVU	b. Belvedere KVU	822
KTB	b. Gulfstream	851	KVX	b. Allaguash	816
KTC	b. Shenango	898	KVY	b. William Isom	929
KTD	b. Ligonier	869	KVZ	b. Relay	891
KTE	b. Winifred	929	KWA	b. Mt. Vernon Bridge	877
KTF	b. J. M. Guffey	858	KWB	b. Fort Pitt Bridge	846
KTG	b. Gulfoil	851	KWC	b. Morro Castle	877
KTH	b. Robert P. Clark	892	KWD	b. Antilla	817
KTI	b. Brilliant	825	KWE	b. Santiago	896
KTJ	b. Comet	833	KWF	b. Cauto	829
KTL	b. Rayo	891	KWG	b. Seguranca	897
KTM	b. Eocene	843	KWH	c. Port Chatham	521
KTN	b. Perfection	886	KWI	b. Camaguey	827
KTO	b. John D. Rockefeller	858	KWJ	b. Yucca KWJ	931
KTP	b. James McGee	857	KWK	b. W. B. Keene	925
KTO	b. City of Everett	831	KWL	b. Yadkin	931
KTR	b. Radiant	890	KWM	b. Panuco KWM	885
KTS	b. Vesta	923	KWN	b. Guantanamo	851
KTT	b. Paraguay KTT	885	KWN	b. Katrina Luckenbach	860
KTU	b. Sun	916	KWO	c. Port Beauclair	521
KTV	b. Toledo	920	KWP	b. Sunoil	916
KTX	b. Socony	899	KWQ	c. Salt Chuck	522
KTY	b. W. C. Teagle	925	KWR	c. Port Moller	521
KTZ	b. Brindilla	825	KWS	c. Lost Harbour	521
KUA	b. Gulfight	851	KWT	c. Teller	522
KUB	b. Gulfmaid	851	KWV	b. Sacramento KWV	895
KUC	b. Gulf of Mexico	851	KWW	c. Chicagof	519
KUD	b. Gulfland	851	KWX	b. Mexico KWX	875
KUE	b. Gulfcoast	851	KWY	b. Monterey KWY	876
KUF	b. Mundelta	877	KWZ	b. Esperanza	844
KUG	b. Munplace	877	KXA	b. Boston KXA	824
KUH	b. Munwood	877	KXB	b. City of Lowell	831
KUI	b. Munamar	877	KXC	b. Commonwealth	
KUJ	b. Mundale	877	KXD	KXC	833
KUK	b. Munsomo	877	KXD	b. Firmore	845
KUL	b. Louisiana KUL	870	KXE	b. Maine KXD	871
KUM	b. Texas KUM	919	KXF	b. Mohawk KXE	875
KUN	b. Neptune KUN	879	KXG	b. New Hampshire	
KUO	b. Northwestern KUO	881	KXH	KXF	879
KUP	b. Pennsylvania KUP	886	KXI	b. Archer	818
KUQ	b. Maine KUQ	871	KXJ	b. Plymouth FXH	887
KUR	b. Georgia KUR	849	KXK	b. Priscilla	888
KUS	b. Florida KUS	846	KXL	b. Providence	888
KUT	b. Pan-American	884	KXM	c. Funter, Alaska	519
KUU	b. Brabant	824	KXN	b. City of Taunton	831
KUV	b. Virginia KUV	923	KXO	b. Mohegan	875
KUW	b. New York KUW	880	KXP	b. New Haven KXN	879
KUX	b. Munalbro	877	KXQ	b. City of Brockton	831
KUZ	b. Coastwise	833	KXR	b. Pregonnock	886
KVA	b. Apache KVA	818	KXS	b. Chester W. Chapin	830
KVB	b. Arapahoe	818	KXT	b. Richard Peck	891
KVC	b. Comanche KVC	833	KXU	b. Boston KXS	824
KVD	b. Munrio	877	KXV	b. Fairmont	845
KVE	b. Munindies	877	KXW	b. Westfield	926
KVF	b. Iroquois KVF	856	KXX	c. Nelson Lagoon,	
KVG	b. Chestnut Hill	830		Alaska	521
KVH	b. Huron KVH	855		c. Ikatan, Alaska	520
KVI	c. Unga Island, Alaska	522		b. Stephen R. Jones	903

PAGE			PAGE
869	KBUI	b. Vittorie Emmanuel	
845		III	923
859	KBUO	b. Westmount.. ..	927
881	KBUU	b. Westboro	925
835	KCAE	b. Chetopa	830
877	KCAU	b. Ameland KCAU ..	817
829	KCOE	b. Nipsic	880
873	KDAB	c. Hog Island, Penn..	597
522	KDAH	c. Fairpoint, Va. ..	595
816	KDEA	b. Lake Fernwood ..	864
520	KDOI	b. Consort	834
518	KEBC	b. Nehalem	879
819	KEBD	b. Abron	814
880	KEBF	b. Edgefield	842
883	KEBG	b. Fort Stevens	846
827	KEBJ	b. Fort Scott	846
859	KEBK	b. Fort Smith	846
931	KEBL	b. Fort Sill	846
891	KEBM	b. Lake Giltedge	866
819	KEBN	b. Lake Girth.. ..	866
924	KEBP	b. Lake Farabee	864
818	KEBQ	b. West Henshaw	927
878	KEBR	b. Lake Strabo	868
815	KEBS	b. Jekyl	858
816	KEBT	b. Nesco	879
819	KEBV	b. Lake Flushing	865
834	KEBX	b. Remus	891
932	KEBZ	b. Lambs (The)	868
843	KECB	b. Edenton	842
828	KECC	b. Marshfield	872
853	KECD	b. Alushan	816
857	KECF	b. Cawker	829
854	KECG	b. Chicago Bridge	831
851	KECJ	b. Decatur Bridge	837
872	KECK	b. Hico.. ..	854
844	KECL	b. Opelika	883
893	KECM	b. Lake Gitano	866
891	KECN	b. Lake Fannin	864
667	KECR	b. West Tacook	928
896	KECS	b. Duquesne	839
844	KECT	b. Horado	855
922	KECV	b. Lake Flynus	865
871	KECX	b. West Imboden	927
874	KECZ	b. Ahala	815
880	KEDB	b. Balosaro	820
518	KEDC	b. Dalagada	837
819	KEDD	b. Acrema	814
824	KEDF	b. Yawah	931
867	KEDG	b. Kamesit	859
866	KEDJ	b. Marne KEDJ	872
863	KEDK	b. Onekama	883
868	KEDL	b. Fame	845
867	KEDM	b. Lake Faribault	864
868	KEDN	b. Lake Fariston	864
868	KEDP	b. Lake Farley	864
863	KEDQ	b. West Maximus	927
865	KEDR	b. Western Glen	926
818	KEDS	b. Imufka	856
846	KEDT	b. West Quechee	928
868	KEDV	b. West Nosska	927
865	KEDX	b. West Hardaway	927
867	KEDZ	b. West Hargrave	927
863	KEFB	b. Sac City	895
867	KEFC	b. West Carnifax	925
819	KEFD	b. Bar Harbor	821
868	KEFF	b. Tanka	919
867	KEFG	b. Coolspring	834
868	KEFJ	b. Copalgrove	834
868	KEFK	b. Cerro Gardo	829

		PAGE			PAGE
KEFL	b. Chamberino ..	829	KELQ	b. Prusa ..	888
KEFM	b. Lake Inaha ..	866	KELR	b. Cochín ..	833
KEFN	b. Lake Friar ..	865	KELS	b. Damacan ..	837
KEFP	b. Lake Frio ..	865	KELT	b. Dardora ..	837
KEFQ	b. Western Knight ..	926	KELV	b. Oback ..	882
KEFR	b. Ossining ..	883	KELX	b. Oyaka ..	884
KEFS	b. West Harian ..	927	KELZ	b. Nawitka ..	879
KEFT	b. City of Eureka ..	831	KEMB	b. Ethelmute ..	844
KEFX	b. West Harshaw ..	927	KEMC	b. Awonsdaw ..	819
KEFZ	b. West Harsh ..	927	KEMD	b. Birchleaf KEMD ..	823
KEGB	b. Morganza ..	876	KEMF	b. Guilford ..	851
KEGC	b. Bristol ..	825	KEMG	b. Susanna II ..	917
KEGD	b. Balabac ..	820	KEMJ	b. Panay ..	884
KEGF	b. Eclipse ..	842	KEMK	b. Hoxie ..	855
KEGG	b. Chamblee ..	829	KEML	b. Jacox ..	857
KEGJ	b. Chaparel ..	829	KEMM	b. Covalt ..	835
KEGK	b. Chantier ..	829	KEMN	b. Covedale ..	835
KEGL	b. Lake Foxcraft ..	865	KEMP	b. Coven ..	835
KEGM	b. Dirigo ..	838	KEMQ	b. Finback ..	845
KEGN	b. Lake Frolono ..	865	KEMR	b. Oraton ..	883
KEGP	b. Lake Frugality ..	865	KEMT	b. Tavernilla ..	919
KEGQ	b. Saluda ..	895	KEMV	b. Santurce ..	896
KEGR	b. Lake Frohna ..	865	KEMX	b. West Vaca ..	928
KEGS	b. West Hartland ..	927	KEMZ	b. Ballenas ..	820
KEGT	b. West Hartley ..	927	KENB	b. Tyee KENB ..	921
KEGX	b. West Hassayampa ..	927	KENC	b. East Cape ..	842
KEJB	b. Kokomo ..	861	KEND	b. Triumph ..	921
KEJC	b. Ammonoosus ..	817	KENF	b. Yaquina ..	931
KEJD	b. Easterling ..	842	KENG	b. West Avenal ..	925
KEJF	b. Western Ally ..	926	KENJ	b. West Compo ..	926
KEJG	b. Lake Fraichur ..	865	KENK	b. West Modus ..	927
KEJJ	b. Lake Fraley ..	865	KENL	b. Boone ..	824
KEJK	b. Lake Grainger ..	866	KENM	b. Coverun ..	835
KEJL	b. Lake Grama ..	866	KENN	b. Cowan ..	835
KEJN	b. Lake Fanbush ..	864	KENP	b. Lake Elkwood ..	863
KEJP	b. Lake Faulk ..	864	KENQ	b. Ballew ..	820
KEJQ	b. Cabegon ..	826	KENR	b. Itompa ..	857
KEJS	b. West Amargosa ..	925	KENS	b. Cabrille ..	826
KEJT	b. William M. Mills ..	929	KENT	b. Lake Frecks ..	865
KEJV	b. Faraby ..	845	KENV	b. Ballcamp ..	820
KEJX	b. Transportation ..	921	KENX	b. Clincho ..	832
KEKB	b. East Wind ..	842	KENZ	b. Banaran ..	821
KEKC	b. Norma ..	880	KEPB	b. Fort Leavenworth ..	846
KEKD	b. West Cobalt ..	925	KEPC	b. Burnwood ..	826
KEKF	b. Berela ..	823	KEPD	b. Diablo ..	838
KEKG	b. Lake Grampian ..	866	KEPF	b. Mercer ..	874
KEKJ	b. Lake Grampus ..	866	KEPG	b. Agwistar ..	815
KEKL	b. Saguache ..	895	KEPJ	b. Brevard ..	825
KEKM	b. Lake Fansdale ..	864	KEPK	b. Briarcliff ..	825
KEKN	b. Lake Fanquier ..	864	KEPL	b. Aledo ..	816
KEKP	b. Lake Furlough ..	865	KEPM	b. Lake Elkwater ..	863
KEKQ	b. Castle Wood ..	829	KEPN	b. Lake Ellendale ..	863
KEKR	b. Homestead ..	854	KEPP	b. Lake Ellenorah ..	863
KEKS	b. Tartar ..	919	KEPQ	b. Proctor ..	888
KEKT	b. Oscoda ..	883	KEPR	b. Sahale ..	895
KEKV	b. Neabscos ..	879	KEPS	b. Lazy Bay, Alaska ..	520
KEKX	b. Batanes ..	821	KEPT	b. Saco ..	895
KEKZ	b. Bluffton ..	823	KEPV	b. Wallingford ..	924
KELB	b. North Pole ..	881	KEPX	b. Alcís ..	816
KELC	b. Polar Star ..	887	KEPZ	b. Alektor ..	816
KELD	b. Albatross KELD ..	815	KEQB	b. Dallas KEQB ..	837
KELF	b. Eldora ..	843	KEQC	b. Barugo ..	821
KELG	b. Buchannon ..	825	KEQD	b. Bolikow ..	823
KELJ	b. Berea ..	822	KEQF	b. Banica ..	821
KELK	b. West Elcajon ..	926	KEQG	b. Baldrige ..	820
KELL	b. Bonnsborough ..	823	KEQJ	b. Baldrock ..	820
KELM	b. Lake Fernando ..	864	KEQK	b. Belvidere ..	822
KELN	b. Lake Ferrona ..	864	KEQL	b. Nemassa ..	879
KELP	b. Lake Fessenden ..	864	KEQM	b. Lake Ellerslie ..	863

PAGE			PAGE
863	KEVN	b. Osaqumsick ..	883
864	KEVP	b. Ozette ..	884
814	KEVQ	b. Brookland ..	825
847	KEVR	b. Hartwood ..	852
844	KEVS	b. Chappell ..	829
887	KEVT	b. Schodack ..	897
895	KEVV	b. Schoharie ..	897
884	KEVX	b. Tollard ..	920
821	KEVZ	b. Lake Faresman ..	864
821	KEXB	b. McKeesport ..	874
860	KEXC	b. Puyallup ..	889
903	KEXD	b. Elihu Thomson ..	843
898	KEXF	b. West Munham ..	927
926	KEXG	b. West Nohno ..	927
922	KEXJ	b. West Togus ..	928
848	KEXK	b. West Totant ..	928
864	KEXL	b. Lake Folcroft ..	865
864	KEXM	b. Wawalona ..	925
864	KEXN	b. Moline ..	875
931	KEXP	b. Cineas ..	831
822	KEXQ	b. South Bend ..	900
823	KEXR	b. Grand Haven ..	850
823	KEXS	b. Milwaukee ..	875
875	KEXT	b. Peter H. Crowell ..	886
829	KEXV	b. Hoven ..	855
865	KEXX	b. West Cajoot ..	925
895	KEXZ	b. Glymont ..	849
829	KEZB	b. Lake Sapor ..	867
818	KEZC	b. Lake Fonda ..	865
896	KEZD	b. Lake Fontana ..	865
925	KEZF	b. Lake Fontanet ..	865
865	KEZJ	b. Lake Gilboa ..	866
835	KEZK	b. Lake Gilpen ..	866
864	KEZL	b. Lake Gilta ..	866
864	KEZM	b. West Harcuvar ..	927
864	KEZN	b. West Hembrie ..	927
823	KEZP	b. West Hematite ..	927
852	KEZQ	b. Glyndon ..	849
837	KEZR	b. West Celina ..	925
837	KEZS	b. Brookside ..	825
856	KEZT	b. Gray Eagle ..	850
837	KEZV	b. Gray Cloud ..	850
853	KEZX	b. Mannahocking ..	872
822	KEZZ	b. Poughkeepsie ..	888
889	KFAI	b. Glendola ..	849
889	KFAO	b. Glendoyle ..	849
844	KFEO	b. Monaha ..	876
824	KGAE	b. New Windsor ..	880
877	KGOE	b. Lake Harney ..	866
930	KGUE	b. Caribbean ..	828
824	KGUI	b. Apex ..	818
819	KIBB	b. Lake Glebe ..	866
842	KIBC	b. Silverbrook ..	899
842	KIBD	b. Shenandoah ..	898
819	KIBF	b. Milwaukee Bridge ..	875
819	KIBG	b. National Bridge ..	879
824	KIBJ	b. Passaic Bridge ..	885
824	KIBK	b. Opequan ..	883
858	KIBL	b. Masca ..	873
849	KIBM	b. Wisconsin Bridge ..	930
817	KIBN	b. S. Malta ..	918
883	KIBP	b. Woodman ..	930
931	KIBQ	b. Saugus ..	897
926	KIBR	b. Craftsman ..	835
843	KIBS	b. Braxton ..	825
843	KIBT	b. Corvallis ..	835
846	KIBV	b. Brentwood ..	825
850	KIBX	b. Wonahbe ..	930
880	KIBZ	b. Byfield ..	826

972 Year-Book of Wireless Telegraphy and Telephony

		PAGE			PAGE
KICD	b. Dardania ..	837	KIGZ	b. Ashbee ..	819
KICF	b. Datis ..	837	KIJB	b. Lake Candelaria ..	863
KICG	b. Dertona ..	838	KIJC	b. Balsam ..	820
KICJ	b. Diana KICJ ..	838	KIJD	b. Barrenfark ..	821
KICK	b. Deva ..	838	KIJE	b. Barryton ..	821
KICL	b. Natenna ..	879	KIJG	b. Wicasta ..	929
KICM	b. Edgewood ..	843	KIJJ	b. Sabotawan ..	861
KICN	b. Eldridge ..	843	KIJK	b. Kisnop ..	861
KICP	b. West Islay ..	927	KIJL	b. Edellyn ..	842
KICQ	b. West Isleta ..	927	KIJM	b. Schroon ..	897
KICR	b. Gaffney ..	847	KIJN	b. Knoxville ..	861
KICS	b. Zarembo ..	931	KIJP	b. Montgomery KIJP ..	876
KICT	b. Sea Bird ..	897	KIJQ	b. Hoxbar ..	855
KICV	b. Gunston Hall ..	851	KIJR	b. Barstow ..	821
KICX	b. Alta ..	816	KIJS	b. Butterfield ..	826
KICZ	b. Admiral Evans ..	814	KIJT	b. Buttercup ..	826
KIDB	b. Lake Granby ..	866	KIJV	b. Bethlehem Bridge ..	823
KIDC	b. Satartia ..	896	KIJX	b. Brasher ..	825
KIDD	b. West Alcoz ..	925	KIJY	b. Dade County ..	837
KIDF	b. Hegira ..	853	KIKB	b. Hillsborough County ..	854
KIDJ	b. Mulpua ..	877	KIKC	b. Jackson ..	857
KIDK	b. Borad ..	824	KIKD	b. Johnson City ..	858
KIDL	b. Genesee KIDL ..	849	KIKF	b. Jefferson County ..	858
KIDM	b. Anniston ..	817	KIKG	b. S. Johns County ..	918
KIDN	b. Chattanooga KIDN ..	830	KIKJ	b. S. Augustine ..	917
KIDP	b. Louisville Bridge ..	870	KIKK	b. Shortsville ..	898
KIDQ	b. Schoodic ..	897	KIKL	b. Colorado Springs ..	833
KIDR	b. Romulus ..	892	KIKM	b. Worcester ..	930
KIDS	b. Lake Canaveral ..	863	KIKN	b. West Kasson ..	927
KIDT	b. Barrallton ..	821	KIKP	b. Mendora ..	874
KIDV	b. Waukau ..	925	KIKQ	b. Moosabee ..	876
KIDX	b. Waukegan ..	925	KIKR	b. Ambridge ..	817
KIDZ	b. Donora ..	839	KIKS	b. Clairton ..	832
KIFB	b. West Irmo ..	927	KIKT	b. Argenta ..	818
KIFC	b. Hukey ..	855	KIKV	b. Evansville ..	844
KIFD	b. West Cavanal ..	925	KIKW	b. Bon Secour ..	824
KIFE	b. Alderman ..	816	KIKX	b. West Islip ..	927
KIFG	b. Favorite KIFG ..	845	KIKY	b. Clio ..	832
KIFJ	b. Kishacoquillas ..	861	KILB	b. Clodia ..	832
KIFK	b. Chautaugia ..	830	KILC	b. Himoto ..	854
KIFL	b. Delphine ..	838	KILD	b. Asotin ..	819
KIFM	b. Louis Luckenbach ..	870	KILE	b. Elmsport ..	843
KIFN	b. Humrick ..	855	KILF	b. Edisto ..	843
KIFP	b. West Conob ..	926	KILG	b. Edmore ..	832
KIFQ	b. Bound Brook ..	824	KILH	b. City of Spokane ..	925
KIFR	b. Barranca KIFR ..	821	KILI	b. Waxahachie ..	879
KIFS	b. Kimta ..	861	KILJ	b. Neshaming ..	874
KIFT	b. Angelina ..	817	KILK	b. Meridon ..	898
KIFV	b. Andrea F. Luckenbach ..	817	KILL	b. Shaume ..	897
KIFX	b. Youngstown ..	931	KILM	b. Scantic ..	843
KIFY	b. Lorain ..	870	KILN	b. Elkwater ..	843
KIGB	b. Lake Glencoe ..	866	KILP	b. West Calumb ..	925
KIGC	b. Humacenna ..	855	KILQ	b. Ipswich ..	856
KIGD	b. Hulver ..	855	KILR	b. Manasses ..	871
KIGF	b. Seekonk ..	897	KILS	b. West Cawthon ..	925
KIGG	b. Walden ..	923	KILT	b. Tuckanuck ..	921
KIGH	b. Director KIGJ ..	838	KILV	b. Tripp ..	921
KIGI	b. Intan ..	856	KILW	b. Deerlodge ..	837
KIGJ	b. Polybius ..	887	KILX	b. Coral ..	834
KIGK	b. Lake Farlin ..	864	KILY	b. West Chetac ..	925
KIGN	b. Atlantus ..	819	KILZ	b. Cushnoc ..	836
KIGP	b. Gratin ..	850	KIMB	b. Vacuum II ..	922
KIGR	b. Blair ..	823	KIMC	b. S. Leonora ..	918
KIGS	b. Sanaelisa ..	896	KIMD	b. Winyah ..	930
KIGT	b. Sol Navis ..	899	KIME	b. Salvation Lass ..	895
KIGU	b. Bessemer ..	823	KIMF	b. Pontchartrain ..	888
KIGV	b. Battonville ..	821	KIMG	b. East Side ..	842
KIGX	b. Yakolow ..	931	KIMH	b. Dochet ..	839
			KIMI	b. Burnwell ..	826

PAGE			PAGE
877	KIRR	b. Cambridge KIRR	827
863	KIRS	b. John Ena	858
855	KIRT	b. Derbyline	838
887	KIRV	b. Lake Fairfax	864
882	KIRX	b. Casper	829
855	KIRZ	b. Glen Ridge	849
892	KISC	b. Orcus	883
835	KISD	b. Seattle Spirit	897
924	KISF	b. Wheatland Montana	928
864	KISG	b. Elkridge	843
866	KISJ	b. Stanley KISJ	903
886	KISK	b. West Keene	927
869	KISM	b. Baldbutte	820
927	KISN	b. Lake Fagundus	864
927	KISP	b. Lake Fairlie	864
843	KISQ	b. Afel	815
883	KISR	b. City of Fairbury	831
824	KISS	b. Liberty Land	869
821	KIST	b. Laborer	862
827	KISV	b. Asquam	819
837	KISX	b. Lake Farrar	864
885	KISZ	b. Lake Stobi	868
819	KITB	b. Lake Falama	864
888	KITC	b. Babboosic	820
924	KITF	b. Firthcliffe	845
930	KITG	b. Kittegaun	861
839	KITJ	b. Innoko	856
925	KITK	b. Bellbuckle	822
928	KITL	b. Wytheville	931
889	KITM	b. Betsy Bell	823
922	KITN	b. Nameaug	878
865	KITP	b. Lake Gadsden	865
903	KITQ	b. Lake Singara	867
864	KITR	b. Keshena	861
897	KITS	b. Kiokee	861
849	KITT	b. Kiron	861
843	KITV	b. Kitchi	861
870	KITX	b. Richmond Boro	891
871	KITZ	b. West Inskip	927
864	KIVB	b. Minnequa	875
822	KIVC	b. Kewanee	861
	KIVD	b. Marina KIVD	872
927	KIVF	b. Lightburne	869
827	KIVG	b. Mercer Victory	874
835	KIVJ	b. Hatchie	852
925	KIVK	b. Traveller	921
846	KIVL	b. Knights Island	861
833	KIVM	b. Lake Fear	864
832	KIVN	b. Explorer KIVN	844
879	KIVP	b. Westoil	927
864	KIVQ	b. Huguenot	855
864	KIVR	b. Devolente	838
919	KIVS	b. Delfina	838
855	KIVT	b. Delisle	838
821	KIVV	b. West Cactus	925
821	KIVX	b. Guardsman	851
835	KIVZ	b. Custodian KIVZ	837
846	KIXB	b. West Cheswald	925
864	KIXC	b. West Raritans	928
879	KIXD	b. Lackawanna Valley	862
925	KIXF	b. Ablanset	814
879	KIXG	b. Asabeth	819
865	KIXJ	b. Fourth Alabama	847
898	KIXK	b. Lafcomo	862
886	KIXL	b. Lebanon KIXL	869
818	KIXM	b. Lockport	870
851	KIXN	b. Lordship Manor	870
923	KIXP	b. Nonantum	880
837	KIXQ	b. Putnam	888

		PAGE			PAGE
KIXR	b. Tulsa ..	921	KLAE	b. Overbrook ..	854
KIXS	b. Abraham Lincoln ..	814	KLAI	b. Afrinnia ..	815
KIXT	b. Lake Flagon ..	865	KLAO	b. Lake Crystal ..	863
KIXV	b. Champion ..	829	KLAU	b. Lake Winona ..	868
KIXX	b. Wekika ..	925	KLEA	b. Lake Maurepas ..	867
KINZ	b. West Selene ..	928	KLEE	b. Lake St. Regis ..	868
KIZB	b. Delco ..	838	KLEI	b. Lake Allen ..	862
KIZC	b. Bakersfield ..	820	KLEO	b. Lake Clear ..	863
KIZD	b. Barthney ..	821	KLEU	b. Lake Pewaukee ..	867
KIZF	b. Buffalo Bridge ..	826	KLIA	b. Lake Otisco ..	867
KIZG	b. Parksville ..	885	KLIE	b. Lake Como ..	863
KIZJ	b. Dauperata ..	837	KLII	b. Lake Duane ..	863
KIZK	b. Katherine ..	860	KLIO	b. Lake Conway ..	863
KIZM	b. Lake Flagstaff ..	865	KLIU	b. Lake Sunapee ..	868
KIZN	b. Lake Flambeau ..	865	KLOA	b. Lake Felicity ..	864
KIZP	b. Shickshinny ..	898	KLOE	b. Lake Hemlock ..	866
KIZQ	b. Bannask ..	821	KLOI	b. Lake Hurst ..	866
KIZR	b. Winona County ..	930	KLOO	b. Lake Lida ..	867
KIZS	b. Vincent ..	923	KLOU	b. Lake Shawano ..	867
KIZV	b. Inlay ..	856	KLUA	b. Lake Capens ..	863
KIZX	b. Labette ..	862	KLUE	b. Lake Sebago ..	867
KIZZ	b. Rockaway Park ..	892	KLUI	b. Lake Cayuga ..	863
KJAA	b. Chebaulip ..	830	KLUO	b. Lake Ennis ..	863
KJAE	b. West Indian ..	927	KLUU	b. Agrista ..	815
KJAI	b. West Durfee ..	926	KMAA	b. Admiral Nicholson ..	815
KJAO	b. West Lianga ..	927	KMAE	b. Evelyn KMAE ..	844
KJAU	b. West Grove ..	927	KMAI	b. Catherine D. ..	829
KJEA	b. Western Ocean ..	926	KMAO	b. Kingfisher KMAO ..	861
KJEE	b. Yellowstone ..	931	KMAU	b. Ampetco ..	817
KJEI	b. John M. Connelly ..	858	KMEA	b. Lassell ..	860
KJEU	b. S. Luisa ..	918	KMEE	b. Piqua ..	887
KJIA	b. Barrington ..	821	KMEI	b. Orizaba ..	883
KJIE	b. Walter A. Luckenbach ..	924	KMEO	b. Cletus Schneider ..	832
KJII	b. Muscatine ..	877	KMEU	b. Pasadena ..	885
KJIO	b. Paul H. Harwood ..	885	KMIA	b. Carib KMIA ..	828
KJIU	b. Carib KJIU ..	828	KMIE	b. Cape Henry ..	827
KJOA	b. Faith ..	845	KMII	b. Masuda ..	873
KJOE	b. W. M. Irish ..	930	KMIO	b. Willimantic ..	929
KJOI	b. Sturgeon Bay ..	904	KMIU	b. W. M. Burton ..	930
KJOJ	b. West Bridge ..	925	KMOI	b. Eldorado ..	843
KJOU	b. Tuckahoe ..	921	KMOO	b. Oakland ..	882
KJUA	b. Ice King ..	855	KMOU	b. Edward Pierce ..	843
KJUE	b. Radnor ..	890	KMUA	b. Lake Lasang ..	867
KJUI	b. Point Lobos ..	887	KMUE	b. Lake Larga ..	867
KJUC	b. West Alsek ..	925	KMUI	b. Geo. W. Barnes ..	849
KJUJ	b. West Apaum ..	925	KMUO	b. Fassett ..	845
KKAA	c. Sulzer, Alaska ..	522	KMUU	b. Lake Flume ..	865
KKAE	c. Nushagak, Alaska ..	521	KNAA	b. Western Sea ..	926
KKAI	c. Hawk Inlet, Alaska ..	519	KNAE	b. Western Cohas ..	925
KKAO	c. Kussilof, Alaska ..	520	KNAI	b. Western City ..	926
KKAU	b. Avondale ..	819	KNAO	b. Western Chief ..	926
KKEA	b. Cabeza ..	826	KNAU	b. Westford ..	926
KKEE	b. Nanking ..	878	KNEA	b. Western Spirit ..	926
KKEI	b. City of Sydney ..	832	KNEE	b. S. Tecla ..	919
KKEO	b. Waukesha ..	925	KNEI	b. Quinault ..	889
KKEU	b. Mariners Harbor ..	872	KNEO	b. Nahaska ..	878
KKIA	b. Daga ..	837	KNEU	b. Wiskah ..	930
KKIE	b. Forster ..	846	KNIA	b. Wahkiakum ..	923
KKII	b. Eyota ..	844	KNIE	b. Abrigada ..	814
KKIO	b. Wasco ..	924	KNII	b. Cheron ..	830
KKIU	b. Nacogdockes ..	878	KNIO	b. Beloit ..	822
KKOA	b. Biran ..	823	KNIU	b. Coloma ..	833
KKOE	b. Lake Annette ..	862	KNOA	b. Manada ..	871
KKOO	b. Chimo ..	831	KNOE	b. Boulton ..	824
KKOU	b. Wakanna ..	923	KNOI	b. Bancroft KNOI ..	821
KKUA	b. Wayucan ..	925	KNOO	b. Kaskaskia ..	860
KKUI	b. William G. Mather ..	929	KNOU	b. Bonnafon ..	823
KLAA	b. Luella ..	870	KNUA	b. Fonduco ..	846
			KNUE	b. Majave ..	871

PAGE			PAGE
931	KPOI	<i>b. Lonoke</i>	870
873	KPOO	<i>b. Bonifay</i>	823
824	KPOU	<i>b. Salmon</i>	895
898	KPUA	<i>b. Makanda</i>	871
893	KPUE	<i>b. Belding</i>	822
883	KPUI	<i>b. Kineo</i>	861
922	KPUO	<i>b. Benzonia</i>	823
843	KPUU	<i>b. Barabos</i>	821
838	KQAA	<i>b. Cabura</i>	826
927	KQAE	<i>b. Harney</i>	852
863	KQAI	<i>b. Wallowa</i>	924
931	KQAO	<i>b. Calala</i>	827
823	KQAU	<i>b. Dalana</i>	837
849	KQEA	<i>b. Clackamas</i>	832
821	KQEE	<i>b. Anoka</i>	817
821	KQEI	<i>b. Bell Brook</i>	822
867	KQEO	<i>b. Lake Charlotte</i>	863
820	KQIA	<i>b. Corozal</i>	835
881	KQIE	<i>b. Farnam</i>	845
863	KQII	<i>b. S. Olivia</i>	918
867	KQIO	<i>b. Deranof</i>	838
843	KQIU	<i>b. West Ekonk</i>	926
919	KQOA	<i>b. Anacortes</i>	817
880	KQOE	<i>b. Delight</i>	838
864	KQOI	<i>b. Western Light</i>	926
818	KQOO	<i>b. Western Maid</i>	926
927	KQOU	<i>b. Bosworth</i>	824
843	KQUA	<i>b. Allice</i>	816
872	KQUE	<i>b. Lancaster KQUE</i>	868
845	KQUI	<i>b. Bedloe</i>	822
834	KQUO	<i>b. Lake Chelan</i>	863
832	KQUU	<i>b. West Gambo</i>	927
866	KRAA	<i>b. West Coast</i>	925
853	KRAE	<i>b. Mauban</i>	873
928	KRAI	<i>b. Bromela</i>	825
927	KRAO	<i>b. Brompton</i>	825
863	KRAU	<i>b. Bronche</i>	825
880	KREA	<i>b. Cape Romain</i>	827
916	KREE	<i>b. Gulfport</i>	851
864	KREI	<i>b. Lake Washburn</i>	868
925	KREO	<i>b. Lake Mary</i>	867
898	KREU	<i>b. Irtysch</i>	856
845	KRIA	<i>b. Lake Daraga</i>	863
852	KRIE	<i>b. Astoria KRIE</i>	819
874	KRII	<i>b. Lake Elsinore</i>	863
887	KRIO	<i>b. Octorara KRIO</i>	882
843	KRIU	<i>b. Liberator</i>	869
820	KROA	<i>b. Blythedale</i>	823
855	KROE	<i>b. Anima</i>	817
895	KROI	<i>b. Wampum</i>	924
822	KROO	<i>b. Wassaic</i>	924
838	KROU	<i>b. Garibaldi KROU</i>	848
875	KRUA	<i>b. Cresap</i>	836
521	KRUE	<i>b. Brookwood</i>	825
887	KRUI	<i>b. S. Flavia</i>	917
920	KRUO	<i>b. Wakulla</i>	923
823	KRUU	<i>b. Socony 88</i>	899
860	KSAA	<i>b. Socony 89</i>	899
823	KSAE	<i>b. Rose Mahoney</i>	892
823	KSAI	<i>b. Capines</i>	827
827	KSAO	<i>b. Lake Conesus</i>	863
837	KSEA	<i>b. Absecon</i>	814
877	KSEE	<i>b. Mineola</i>	875
876	KSEI	<i>b. Eastern Chief</i>	842
887	KSEO	<i>b. Quindnic</i>	889
898	KSEU	<i>b. Jonancy</i>	858
857	KSIA	<i>b. East Cliff</i>	842
823	KSIE	<i>b. Glen White</i>	849
889	KSII	<i>b. Lake Catherine</i>	863

976 Year-Book of Wireless Telegraphy and Telephony

		PAGE			PAGE
KSIO	b. Argonne ..	818	KVIO	b. Lake Pearl..	867
KSIU	b. Lake Benton ..	862	KVIU	b. Allentown ..	816
KSOA	b. Polar Sea ..	887	KVOE	b. Lake Garza ..	865
KSOE	b. Lake Eckhart ..	863	KVOI	b. Lake Gasper ..	865
KSOI	b. Lake Wimico ..	868	KVOO	b. Lake Yelverton ..	868
KSOO	b. Lake Duncan ..	863	KVOU	b. Lake Kakona ..	865
KSOU	b. Bylayl ..	826	KVUA	b. Lake Ormco ..	867
KSUA	b. F. D. Asche ..	845	KVUE	b. Lake Akkra ..	862
KSUE	b. Juno KSUE ..	859	KVUI	b. Lake Licking ..	867
KSUI	b. Colundo ..	833	KVUO	b. Lake Gedney ..	865
KSUO	b. Umatilla ..	922	KVUU	b. Lake Hewes ..	866
KSUU	b. Montezuman ..	876	KXAA	b. Lake Alvada ..	862
KTAA	b. Alloway ..	816	KXAE	b. Lake Delancey ..	863
KTAE	b. Lake Damita ..	863	KXAI	b. Lake Galera ..	865
KTAI	b. Lake Eliko..	863	KXAO	b. Lake Otsuquago ..	867
KTAO	b. Lake Frances ..	865	KXAU	b. Lake Harris ..	866
KTAU	b. Eastern Star ..	842	KXEA	b. Lake Pleasant ..	867
KTEA	b. Eastern Sea ..	842	KXEE	b. Lake Marion ..	867
KTEE	b. Western Cross ..	926	KXEI	b. Lake Sanford ..	867
KTEI	b. Winnebago KTEI..	929	KXEO	b. Lake Gardner ..	865
KTEO	b. Fort Wright ..	847	KXEU	b. Lake Ville ..	868
KTEU	b. Boureville ..	824	KXIA	b. J. W. McGrath ..	859
KTIA	b. Bowesmont..	824	KXIE	b. Calveras ..	827
KTIE	b. Eastern Sun ..	842	KXII	b. Calicorock ..	827
KTIO	b. Fresno ..	847	KXIO	b. Calispell ..	827
KTIU	b. Lake Blanchester ..	863	KXIU	b. Lake Calistago ..	863
KTOA	b. Lake Narka ..	867	KXOA	b. Star of Lapland ..	903
KTOE	b. Lake Monroe ..	867	KXOE	b. Severance ..	898
KTOI	b. Lake Greenwood ..	866	KXOI	b. Standard KXOI ..	903
KTOO	b. Lake Yemassee ..	868	KXOO	b. Oakwood ..	882
KTOU	b. Lake Markham ..	867	KXOU	b. Lake Lesa ..	867
KTUA	b. Lake Ledan ..	867	KXUA	b. Lake Geneva ..	865
KTUE	b. Lake Bledsoe ..	863	KXUE	b. Eastern Queen ..	842
KTUI	b. Lake Pepin ..	867	KXUI	b. Lake Lillian ..	867
KTUO	b. Sagadahoc ..	895	KXUU	b. Admiral Sims ..	815
KTUU	b. Lake Pachuta ..	867	KXUU	b. Coyote ..	835
KUBX	c. Koggiung ..	520	KZAA	b. Middlebury ..	875
KUCP	c. Chisik Island ..	519	KZAE	b. Lake Linden ..	867
KUDV	c. Becharof ..	518	KZAI	b. Lake Winthrop ..	868
KUDT	c. Pilot Point ..	521	KZAO	b. Lake Wilson ..	868
KUPQ	c. Ogden, Utah ..	603	KZAU	b. Lake Yahara ..	868
KUVM	c. Iloilo ..	575	KZEA	b. Keketticut ..	860
KUVQ	c. Johnsonwood, Michigan ..	598	KZEE	b. Lake Berdan ..	863
KUVR	c. Jordan, Montana ..	598	KZEI	b. Lake Dymmer ..	863
KUVS	c. New York KUVS ..	603	KZEO	b. Lake Dancy ..	863
KUXG	c. Malangas ..	575	KZEU	b. Lake Agomak ..	862
KUXJ	c. Cebu ..	574	KZIA	b. Lake Aurice ..	862
KUXK	c. Batanagas ..	574	KZIE	b. Lake Winooski ..	868
KUXM	c. Cheboygan ..	594	KZII	b. Lake Belnona ..	862
KUXN	c. Miles City ..	602	KZIO	b. Lake Lillicusun ..	867
KUXP	c. Dallas, Texas ..	594	KZIU	b. Sagaporack ..	895
KUXQ	c. Wichita Falls ..	606	KZOA	b. Lake Medford ..	867
KUXT	c. Long Beach, California ..	601	KZOE	b. Lake Arline ..	862
KUXV	c. Avelon KUXV ..	592	KZOI	b. Lake Helen ..	866
KVAA	b. Lake Osweya ..	867	KZOO	b. Lake Indian ..	866
KVAE	b. Lake Benbow ..	862	KZOU	b. Lake Orange ..	867
KVAI	b. Socony 82 ..	899	KZUA	b. Katia ..	860
KVAO	b. Socony 83 ..	899	KZUE	b. Cape Lookout ..	827
KVAU	b. Yehama ..	931	KZUI	b. Oneco ..	883
KVEA	b. Bellota ..	822	KZUU	b. Line Star ..	870
KVEE	b. Catawba ..	829	KZUU	b. Lake Louise ..	867
KVEI	b. West Galoc ..	927	LP	c. Königswusterhausen (Berlin) ..	553
KVEO	b. Kickapoo ..	861	LZ	c. Leipzig ..	553
KVEU	b. Baladan ..	820	LAA	b. Eidsvold ..	699
KVIA	b. Balliott ..	820	LAB	b. Harald Haarfrage ..	700
KVIE	b. West Arvada ..	925	LAC	b. Norge ..	701
KVII	b. Montclair ..	876	LAD	b. Tordenskjold ..	701
			LAE	b. Frithjof ..	699

PAGE			PAGE
699	LEV	b. Mesna	701
699	LEW	b. Simla	701
699	LEX	b. Sjoa	701
701	LEY	b. Atle Jarl	699
701	LFA	b. Tanafjord	702
701	LFB	b. Bergensfjord	699
701	LFC	b. Atna	699
700	LFD	b. Rena	701
701	LFE	b. Vinstra	702
701	LFF	b. Tysla	702
700	LFG	c. Spitsbergen	583
701	LFH	b. Iris LFH	700
701	LFI	b. Talabot	702
700	LFJ	b. Mira	701
699	LFL	b. Drammensfjord	699
699	LFM	b. Lyngenfjord	701
699	LFO	b. Strinda	702
699	LFQ	b. George Washington	700
699	LFR	c. Röst Radio	571
700	LFS	b. Stavangerfjord	702
699	LFT	b. Hallfried	700
700	LFW	b. Artemis LFW	699
700	LFX	b. Bonna	699
700	LFY	b. Salvage	701
701	LFZ	b. Arly	699
701	LGA	c. Lukula	529
701	LGA	b. Folkvård	699
701	LGB	b. Lidvard	701
	LGC	b. Landvard	701
571	LGD	b. Hamlet	700
571	LGE	b. Thorvald Halvorsen	702
571	LGF	b. Kalfarli	700
699	LGG	b. Vaarli	702
702	LGH	b. Niels Nielsen	701
700	LGI	b. Hanna Nielsen	700
699	LGJ	b. Luise Nielsen	701
702	LGK	c. Utsire Radio	572
571	LGL	b. Capto	699
701	LGM	b. Golaa	700
701	LGN	c. Bergen Radio	571
701	LGO	b. Wellington LGO	702
701	LGP	b. Sagaland	701
700	LGQ	b. Key West	700
701	LGR	b. Golden Gate	700
701	LGS	b. Ramenfjord	701
702	LGT	b. Bessa	699
700	LGU	b. Viking LGU	702
702	LGV	b. Asp	699
699	LGW	b. Borgland	699
699	LGX	b. Breifond	699
701	LGY	b. Hercules LGY	700
701	LGZ	b. Dicto	699
699	LHA	b. Governor Forbes	700
699	LHB	b. Sinaloa	701
702	LHC	b. Baja California	699
700	LHD	b. Regulus	701
702	LHE	b. Landaas	701
701	LHF	b. Utsire	702
699	LHG	b. Rövoer	701
571	LHH	b. Grena	700
701	LHI	b. Balto	699
701	LHJ	b. Sturviken	702
700	LHK	b. Bjonongen	699
701	LHL	b. Solstreif	702
571	LHM	b. Delfinus	699
701	LHN	b. Nevis	701
699	LHU	b. Björnstjerne Bjorn-son	699
572	LHW	b. August	699

		PAGE			PAGE
LHX	b. Sydfold	702	LLI	b. Draga 210	608
LHY	b. Solveig Skogland ..	702	LLJ	b. Draga 211	608
LHZ	b. Morgana	701	LLK	b. Pampero	609
LIA	c. Dársena Norte	524	LLL	b. Ingeniero-Iribas ..	609
LIB	c. Río Santiago, Buenos Aires ..	525	LLM	b. Lisboa	609
LIC	c. Faro Mogotes	524	LLN	b. Berna	608
LID	c. Faro Recalada	524	LLO	b. Bruselas	608
LIE	c. Puerto Militar	525	LLP	b. Ciudad de Buenos Aires ..	608
LIF	c. Cabo de las Virgenes ..	523	LLQ	b. Colonia LLQ	608
LIG	c. Año Nuevo	523	LLR	b. Eolo	608
LIH	c. Ushuaia	525	LLS	b. Guarany	609
LIJ	c. La Paz, Entre Rios ..	524	LLT	b. Helios LLT	609
LIJ	c. Formosa, Argentina ..	524	LLU	b. Labrador LLU	609
LIK	c. Dársena Sud	524	LLV	b. Lambaré	609
LIL	c. Punta Delgada, Chubut ..	525	LLW	b. Londres	609
LIM	c. S. Julian, Santa Cruz ..	525	LLY	b. Madrid LLY	609
LIN	c. Pontón Faro Bahía Blanca	524	LLZ	b. París LLZ	609
LIP	c. Comodoro Rivadavia ..	523	LMB	b. Tritón LMB	609
LIQ	c. Posadas, Misiones ..	525	LMC	b. Venus LMC	609
LIR	c. Puerto Aguirre	525	LMD	b. Washington LMD ..	609
LIS	c. Río Grande, Tierra del Fuego ..	525	LME	b. Camarones	608
LIU	c. Pontón Estacionario de Practicos Interseccion	524	LMG	b. Presidente Mitre ..	609
LIV	c. Pontón Practicos Recalada	524	LMH	b. Presidente Quintana ..	609
LIW	c. Zarate, Buenos Aires ..	525	LMI	b. Río de la Plata LMI ..	609
LIX	c. Martín García	524	LMJ	b. Río Uruguay	609
LJA	c. Rosario de Santa Fé ..	525	LMK	b. Bahía Blanca LMK ..	608
LJB	c. Paraná	524	LML	b. Patagonia	609
LJC	c. Corrientes	523	LMM	b. S. Martín LMM	609
LKA	b. Almirante Brown	608	LMN	b. Cabo Santa María ..	608
LKB	b. Belgrano LKB	608	LMO	b. Cabo Corrientes ..	608
LKC	b. Buenos Aires LKC ..	608	LMQ	b. Draga 16. C.	608
LKD	b. Catamarca	608	LMR	b. Vicente Fidel Lopez ..	609
LKE	b. Chaco	608	LMS	b. Argentino LMS	608
LKF	b. Córdoba LKF	608	LMT	b. Asturiano	608
LKG	b. El Plata LKG	908	LMU	b. Formosa LMU	608
LKH	b. Entre Ríos LKH	608	LMV	b. Humaitá	609
LKI	b. Chubut	608	LMW	b. Draga 212. C.	608
LKJ	b. Fragata Sarmiento ..	608	LNA	b. Ministro Escurrea ..	609
LKK	b. Garibaldi LKK	608	LNB	b. Alferez Mackin'ay ..	608
LKL	b. Gaviota LKL	609	LNC	b. Ona	609
LKM	b. Guardia Nacional ..	609	LND	b. Querandi	609
LKN	b. Independencia	609	LNE	b. Río Negro LNE	609
LKO	b. Jujuy	609	LNF	b. Azopardo	608
LKP	b. La Plata LKP	609	LNG	b. Corrientes LNG	608
LKQ	b. Libertad	609	LNH	b. Misiones	609
LKR	b. Los Andes LKR	609	LNK	b. Draga 14. C.	608
LKS	b. Ingeniero Luis A. Huergo ..	609	LNL	b. Draga 13	608
LKT	b. Moreno	609	LSA	b. W. I. Radcliffe	812
LKU	b. Nueve de Julio	609	LSB	b. Hunsforth	765
LKV	b. Pampa LKV	609	LSC	b. Minerico	779
LKW	b. Paraná LKW	609	LSE	b. Seamew	796
LKX	b. Aristobulo del Valle ..	608	LSF	b. Clan Chisholm	742
LKY	b. Patria LKY	609	LSG	b. Clan Macfadyen	744
LKZ	b. Piedrabuena	609	LSH	b. Clan Menzies	745
LLA	b. Primero de Mayo	609	LSI	b. Juliston	767
LLB	b. Pueyrredón	609	LSJ	b. Graphic	760
LLC	b. Rivadavia	609	LSK	b. Comic	747
LLD	b. Rosario LLD	609	LSL	b. Logic	772
LLE	b. S. Martín LLE	609	LSM	b. Patriotic	786
LLF	b. Uruguay LLF	609	LSN	b. Inishboffin	766
LLH	b. Draga 209	608	LSO	b. Trelaske	804
			LSP	b. Carron	739
			LSQ	b. Bampton	731
			LSR	b. Clan Murray	746
			LST	b. Millais	779
			LSU	b. Bloomfield	735
			LSV	b. Grelfryda	761
			LSW	b. Kings City	769

		PAGE			PAGE
LSX	<i>b. Dorie</i>	751	MAJ	<i>b. Calabria MAJ</i> ..	737
LSY	<i>b. Buranda</i>	737	MAM	<i>b. Matoppo</i>	777
LSZ	<i>b. Breynton</i>	736	MAN	<i>b. S. Dunstano</i> ..	801
LTB	<i>b. Jabiru</i>	767	MAO	<i>b. S. Tirso</i>	801
LTC	<i>b. Benlomond</i> ..	734	MAP	<i>b. Botanist</i>	735
LTD	<i>b. Cosmos</i>	748	MAQ	<i>b. Bolton Castle</i> ..	735
LTF	<i>b. Hillhouse</i>	763	MAR	<i>b. Italia MAR</i>	767
LTG	<i>b. Savan</i>	796	MAU	<i>b. Cardiganshire</i> ..	739
LTI	<i>b. Clearpool</i>	747	MAV	<i>b. Swazi</i>	800
LTIJ	<i>b. Millpool</i>	779	MAX	<i>c. Broomfield, Essex</i> ..	586
LTK	<i>b. Keighley LTK</i> ..	769	MAZ	<i>b. Aronda</i>	729
LTM	<i>b. Albuera</i>	726	MBB	<i>b. Asturias</i>	730
LTN	<i>b. Raven</i>	792	MBC	<i>b. Baltic MBC</i>	731
LTO	<i>b. Macoris</i>	773	MBE	<i>b. Lumen</i>	773
LTP	<i>b. Sagua</i>	795	MBF	<i>b. Saturnia</i>	796
LTQ	<i>b. Minnekahda</i> ..	779	MBG	<i>b. Araguaya</i>	729
LTR	<i>b. Manx Isles</i>	775	MBM	<i>b. Danube MBM</i> ..	749
LTS	<i>b. Clan Macwilliam</i> ..	745	MBO	<i>b. Avon</i>	731
LTU	<i>b. Neva LTU</i>	781	MBP	<i>b. Lancastrian</i>	771
LTV	<i>b. Mahana</i>	773	MBR	<i>b. S. Ricardo</i>	801
LTW	<i>b. Mahia</i>	773	MBT	<i>b. Rimutaka</i>	793
LTX	<i>b. Saxoleine</i>	796	MBV	<i>b. Chignecto</i>	740
LTZ	<i>b. Nagara</i>	780	MBW	<i>b. Maryland</i>	777
LUA	<i>b. Ariadne Alexandra</i> ..	729	MBX	<i>b. Elveric</i>	753
LUB	<i>b. Hannington Court</i> ..	762	MBY	<i>b. Lord Strathcona</i> ..	
LUC	<i>b. City of Winchester</i> ..	742		<i>MBY</i>	772
LUD	<i>b. Wedgwood</i>	811	MCD	<i>b. Viking MCD</i>	807
LUE	<i>b. War Khan</i>	809	MCE	<i>b. Khyber</i>	769
LUG	<i>b. Cymric Vale</i>	749	MCF	<i>b. Canada MCF</i>	738
LUI	<i>b. Albiana</i>	726	MCG	<i>b. Cambria MCG</i> ..	738
LUI	<i>b. Berriedale</i>	734	MCH	<i>b. Banda</i>	731
LUJ	<i>b. Tremayne</i>	804	MCJ	<i>b. Telconia</i>	803
LUK	<i>b. Wimbledon</i>	812	MCL	<i>b. Colonia MCL</i>	747
LUL	<i>b. Ethelwolf</i>	755	MCM	<i>b. Princess Victoria</i> ..	
LUM	<i>b. Ethelaric</i>	755		<i>MCM</i>	791
IUN	<i>b. War Bahadur</i>	808	MCN	<i>b. Corsican</i>	748
LUO	<i>b. Alatrium</i>	726	MCP	<i>b. Ceramic</i>	739
LUP	<i>b. Labicum</i>	770	MCQ	<i>b. Munster</i>	780
LUQ	<i>b. Maihar</i>	774	MCS	<i>b. Snaefell</i>	798
LUR	<i>b. Manaar</i>	774	MCW	<i>b. Ulster</i>	806
LUS	<i>b. Courtown</i>	748	MCX	<i>b. Antar</i>	728
LUT	<i>b. Aberdeen</i>	725	MCY	<i>b. City of Madras</i> ..	741
LUV	<i>b. Laplace LUV</i>	771	MDA	<i>b. Highland Enterprise</i> ..	763
IUW	<i>b. Bayhowel</i>	733	MDC	<i>b. Cedric</i>	739
IUY	<i>b. Astronomer</i>	730	MDE	<i>b. Denis</i>	750
IUZ	<i>b. Baron Fairlie</i>	732	MDF	<i>b. Dominion</i>	751
LWA	<i>b. Jessie</i>	700	MDG	<i>b. Francis</i>	756
LWB	<i>b. Knut Hamsun</i>	701	MDI	<i>b. Pancras</i>	785
LWF	<i>b. Bombay</i>	699	MDJ	<i>b. Stephen</i>	799
LWI	<i>b. Homledal</i>	700	MDK	<i>b. Anselm</i>	728
LWK	<i>b. Graziella</i>	700	MDM	<i>b. Hildebrand</i>	763
LWL	<i>b. Hovland</i>	700	MDN	<i>b. Sardinian</i>	795
LWM	<i>b. Ingeborg Bakkevig</i> ..	700	MDT	<i>b. Caledonian</i>	737
LWO	<i>b. Alaska LWO</i>	699	MDU	<i>b. City of Algiers</i> ..	741
LWP	<i>c. Björnøen Radio</i> ..	571	MDW	<i>b. Worsley Hall</i>	813
LWQ	<i>b. Orwell LWQ</i>	701	MDX	<i>b. Lena</i>	771
LWR	<i>b. Sirrah LWR</i>	701	MDZ	<i>b. Arundel</i>	729
LWU	<i>b. Alstad</i>	699	MEB	<i>b. Ninian</i>	782
LWX	<i>b. Boliviana</i>	699	MED	<i>b. Cassandra</i>	739
LWY	<i>b. Truth</i>	701	MEE	<i>b. Electra</i>	753
LWZ	<i>b. Bravore</i>	699	MEF	<i>b. John Pender</i>	767
LZF	<i>c. Varna</i>	535	MEG	<i>b. Norseman</i>	783
MA	<i>c. Magdeburg</i>	553	MEH	<i>b. Magnet</i>	773
MG	<i>c. Margosatubig</i>	575	MEI	<i>b. Iroquois</i>	766
MAA	<i>b. Carmania</i>	739	MEJ	<i>b. Recorder</i>	792
MAB	<i>b. Kandahar</i>	768	MEK	<i>b. Highland Heather</i> ..	763
MAC	<i>b. S. Gregorio</i>	801	MEL	<i>b. Bohemian</i>	735
MAD	<i>b. Musician</i>	780	MEM	<i>b. Patrol</i>	786
MAG	<i>b. City of Chester</i> ..	741	MEN	<i>b. Navahoe</i>	781

		PAGE			PAGE
MEO	<i>b. Nortonian</i> ..	783	MIV	<i>b. Ottawa</i> ..	785
MEP	<i>b. Highland Laird</i> ..	763	MIW	<i>b. Somali MIW</i> ..	799
MER	<i>b. Highland Watch</i> ..	763	MIX	<i>b. Monadnock MIX</i> ..	779
MES	<i>b. Raeburn</i> ..	791	MIY	<i>b. Suwanee</i> ..	800
MET	<i>b. Raphael</i> ..	792	MJB	<i>b. Maldonado</i> ..	774
MEU	<i>b. Rembrandt MEU</i> ..	793	MJC	<i>b. Suevic</i> ..	800
MEV	<i>b. Romney MEV</i> ..	793	MJF	<i>b. Orcoma</i> ..	784
MEW	<i>b. Nellore</i> ..	781	MJG	<i>b. Orita</i> ..	785
MEY	<i>b. Rossetti</i> ..	794	MJH	<i>b. Haverford</i> ..	762
MEZ	<i>b. Glenetive</i> ..	759	MJJ	<i>b. Oriana</i> ..	784
MFB	<i>b. Sentinel II</i> ..	797	MJK	<i>b. Ortega</i> ..	785
MFJ	<i>b. Cormorant MFJ</i> ..	748	MJL	<i>b. Antillian</i> ..	728
MFK	<i>b. Sherard Osborn</i> ..	797	MJM	<i>b. Merion</i> ..	778
MFL	<i>b. Winifredian</i> ..	812	MJN	<i>b. Scotian</i> ..	796
MFM	<i>b. Aidan</i> ..	726	MJP	<i>b. S. Jeronimo</i> ..	801
MFN	<i>b. Pretorian</i> ..	790	MJQ	<i>b. Westmeath</i> ..	811
MFO	<i>b. Engineer</i> ..	754	MJS	<i>b. Baron Napier</i> ..	732
MFQ	<i>b. Borda</i> ..	735	MJT	<i>b. Llanstephan Castle</i> ..	772
MFR	<i>b. Mayaro</i> ..	777	MJV	<i>b. S. Eduardo</i> ..	801
MFS	<i>b. Banca</i> ..	731	MJW	<i>b. Vauban</i> ..	807
MFT	<i>c. Clifden Rad</i> ..	587	MJX	<i>b. Hartington</i> ..	762
MFU	<i>b. Aeneas</i> ..	726	MKA	<i>b. Ruahine</i> ..	795
MFV	<i>b. Ascanius</i> ..	729	MKB	<i>b. Ruapehu</i> ..	795
MFW	<i>b. Anchises</i> ..	727	MKC	<i>b. Olympic</i> ..	784
MFY	<i>b. Sahara</i> ..	795	MKD	<i>b. Palma MKD</i> ..	785
MGA	<i>b. Kelvinbrae</i> ..	769	MKG	<i>b. Delta MKG</i> ..	750
MGD	<i>b. Mauretania</i> ..	777	MKI	<i>b. Linnet</i> ..	772
MGF	<i>b. Baron Jedburgh</i> ..	732	MKK	<i>b. Medic</i> ..	777
MGG	<i>b. Miltiades</i> ..	779	MKL	<i>b. Asian</i> ..	730
MGI	<i>b. S. Albans</i> ..	801	MKO	<i>b. Chinkoa</i> ..	740
MGJ	<i>b. Orbita</i> ..	784	MKR	<i>b. Beltana</i> ..	733
MGK	<i>b. Marathon</i> ..	776	MKV	<i>b. Remuera</i> ..	793
MGM	<i>b. Demosthenes</i> ..	750	MKW	<i>b. Great City</i> ..	760
MGN	<i>b. Themistocles MGM</i> ..	803	MKX	<i>b. Malakand</i> ..	774
MGO	<i>b. Virginian</i> ..	807	MKZ	<i>b. Ascot</i> ..	729
MGP	<i>b. Orca</i> ..	784	MLA	<i>b. Minnie de Larrinaga</i> ..	779
MGR	<i>b. Orduna</i> ..	784	MLC	<i>b. Celtic</i> ..	739
MGR	<i>c. Mongalla</i> ..	583	MLD	<i>b. Ranger MLD</i> ..	792
MGR	<i>b. Rassay</i> ..	792	MLG	<i>b. Missouri</i> ..	779
MGV	<i>b. Monmouth</i> ..	779	MLL	<i>b. Barranca MLL</i> ..	732
MGX	<i>b. Kirmwood</i> ..	769	MLR	<i>c. Malakal</i> ..	583
MGY	<i>b. Filey</i> ..	756	MLS	<i>b. Manzanares</i> ..	775
MGZ	<i>b. Khiva</i> ..	769	MLT	<i>b. Matina</i> ..	777
MHB	<i>b. Indian</i> ..	766	MLV	<i>b. Nicoya</i> ..	782
MHC	<i>b. Adriatic</i> ..	726	MLX	<i>b. Sheaf Dart</i> ..	797
MHG	<i>b. Carpentaria</i> ..	739	MLY	<i>b. Pacuare</i> ..	785
MHH	<i>c. Poole (The Haven)</i> ..	589	MMB	<i>b. Mackay-Bennett</i> ..	773
MHI	<i>b. Olympia</i> ..	784	MMC	<i>b. Reresby</i> ..	793
MHI	<i>b. Scindia</i> ..	796	MMD	<i>b. Malwa</i> ..	774
MHK	<i>b. Sapphire</i> ..	795	MME	<i>b. Mantua</i> ..	775
MHO	<i>b. Cordobes (El)</i> ..	753	MMF	<i>b. Morea</i> ..	779
MHQ	<i>b. Massilia</i> ..	777	MMG	<i>b. Egypt</i> ..	753
MHR	<i>b. Oxonian</i> ..	785	MML	<i>b. Macedonia MML</i> ..	773
MHS	<i>b. Bampton</i> ..	733	MMR	<i>b. Marmora</i> ..	776
MHT	<i>b. Historian</i> ..	763	MMU	<i>b. China</i> ..	740
MHV	<i>b. Crown of Toledo</i> ..	749	MMX	<i>b. Matheran</i> ..	777
MHX	<i>b. Penrhys</i> ..	787	MNA	<i>b. Pannonia</i> ..	785
MHY	<i>b. Paparua</i> ..	785	MNB	<i>b. Soudan</i> ..	799
MHZ	<i>b. S. Valerio</i> ..	801	MNC	<i>b. Scandinavian</i> ..	796
MID	<i>b. Inanda</i> ..	765	MND	<i>b. S. Lorenzo</i> ..	801
MIE	<i>b. Corcovado MIE</i> ..	747	MNE	<i>b. Menominee</i> ..	778
MIF	<i>b. Inca MIF</i> ..	765	MNG	<i>b. Digby</i> ..	751
MIG	<i>b. Memnon</i> ..	777	MNH	<i>b. Dongola</i> ..	751
MII	<i>b. Potosi</i> ..	790	MNI	<i>b. Iris MNI</i> ..	766
MIJ	<i>b. Sorata</i> ..	799	MNJ	<i>b. Plassy</i> ..	788
MIL	<i>b. Palermo</i> ..	785	MNL	<i>b. Kanawha</i> ..	768
MIP	<i>b. Intaba</i> ..	766	MNT	<i>b. Cambrian</i> ..	738
MIT	<i>b. Genesee MIT</i> ..	758	MNU	<i>b. Caledonia</i> ..	737
MIU	<i>b. Andorinha</i> ..	727	MNX	<i>b. Raithwaite</i> ..	791

PAGE			PAGE
763	MRO	b. Brodmead	737
741	MRQ	b. Andes MRQ	727
780	MRS	b. Kaikoura	767
762	MRV	b. Waiwera	808
744	MRW	b. Kansas	768
733	MRZ	b. S. Melito	801
785	MSA	b. Saxonia	796
747	MSB	b. Karamea	768
785	MSC	b. Ibex	765
795	MSD	b. Reindeer MSD	792
782	MSE	b. Euripides	755
730	MSH	b. Madras	773
761	MSI	b. Kaisar-i-Hind	767
802	MSK	b. City of Vienna	742
808	MSK	c. Moscow	578
750	MSL	b. Trafford Hall	804
736	MSM	b. Nemesis	781
739	MSO	b. Poona	788
730	MSP	b. Maple	775
785	MSQ	b. Knight of the Garter	769
785	MSR	b. Varela	806
754	MSS	b. Baron Berwick	731
738	MST	b. Bamora	731
589	MSU	b. Aquitania	728
769	MSW	b. City of Exeter	741
802	MSX	b. Flandrier	756
740	MSZ	b. Caesarea	737
780	MTB	b. Wyneric	813
739	MTC	b. Teutonic	803
777	MTE	b. Risaldar	793
752	MTF	b. Karmala	768
732	MTH	b. Walton Hall	808
801	MTJ	b. Ebro	752
786	MTK	b. Essequibo	754
731	MTL	b. Crown of Seville	749
777	MTM	b. City of Madrid	741
761	MTN	b. Tunisian	805
787	MTO	b. Rose	794
738	MTP	b. City of Rangoon	741
752	MTQ	b. Dacre Castle	749
769	MTV	b. North Western Miller	783
729			
808	MTX	b. Zealand	813
796	MTY	b. South Western Miller	799
737			
769	MUA	b. Herschel	763
769	MUB	b. Holbein	764
752	MUE	b. Gleniffer	759
752	MUG	b. City of Hankow	741
757	MUH	b. S. Nazario	801
760	MUI	b. Lucerna	773
759	MUK	b. Sir Harvey Adam- son	798
757	MUL	b. Frank Parish	757
760	MUM	b. Borderland	735
808	MUN	b. Sicilian	797
801	MUO	b. Chakdara	739
759	MUP	b. Morvada	780
739	MUQ	b. S. Florentino	801
737	MUS	b. Carmarthenshire	739
748	MUT	b. Pembrokeshire	786
764	MUU	c. Carnarvon Rad	586
784	MUV	c. Towyn	591
753	MUX	b. S. Fernando	801
811	MUZ	b. Zealandic	813
731	MVD	b. Ormara	785
750	MVI	b. Hubert	765
784	MVJ	b. Erinpura	754
760	MVN	b. Victorian	807

		PAGE			PAGE
MVO	b. Gallic	757	MUJM	c. James K. Paulding ..	857
MVP	b. Abinsi	725	NAA	c. Washington, NAA ..	606
MVS	b. Sussex	800	NAB	c. Portland, Maine ..	603
MVV	b. Explorer	755	NAC	c. Portsmouth, New Hampshire ..	604
MVY	b. Inventor	766	NAD	c. Boston	592
MVZ	b. Politician	788	NAD	c. Gloucester, Massachusetts ..	597
MWB	b. Panama MWB ..	785	NAD	c. Deer Island	594
MWC	b. Runic	795	NAD	c. Fourth Cliff	597
MWE	b. Arawa	729	NAE	c. Cape Cod	593
MWF	b. Tainui	802	NAF	c. Newport, Rhode Island ..	602
MWG	b. Mexico MWG ..	778	NAF	c. Price's Neck, Rhode Island ..	604
MWI	b. Ionic	766	NAF	c. Watch Hill, Rhode Island ..	606
MWJ	b. Mersey	778	NAG	c. Fire Island	595
MWK	b. Quillota	791	NAH	c. Montauk Point	602
MWM	b. Guatemala	761	NAH	c. Brooklyn	593
MWN	b. Athenic MWN ..	730	NAH	c. Sea Gate	605
MWP	b. Tactician	801	NAH	c. Rockaway Beach ..	604
MWQ	b. Chakla	739	NAH	c. Sandy Hook	604
MWR	b. Dorington Court ..	751	NAH	c. Mantoloking	601
MWT	b. Corinthic	748	NAI	c. Philadelphia	603
MWW	b. Baron Ardrossan ..	731	NAJ	c. Great Lakes	597
MXX	b. Wandby	808	NAK	c. Annapolis, Maryland ..	591
MWY	b. Circassia	741	NAL	c. Washington	605
MWZ	b. Castalia MWZ ..	739	NAM	c. Norfolk, Virginia ..	603
MXD	b. Vendelia	807	NAM	c. Hampton Roads ..	597
MXF	b. Oakfield	783	NAN	c. Beaufort, North Carolina ..	592
MXG	b. Kinross	769	NAN	c. Cape Lookout	593
MXH	b. Sheaf Spear	797	NAO	c. Charleston, South Carolina ..	594
MXI	b. Ingleby	766	NAO	c. Morris Island, South Carolina ..	602
MXJ	b. Glendhu	759	NAP	c. Anastasia Isle	591
MXM	b. Cordelia	748	NAP	c. S. Augustine, Florida ..	604
MXN	b. Portinglis	789	NAQ	c. Jupiter	598
MXR	b. Delphinula	750	NAR	c. Key West, Florida ..	598
MXS	b. Heathmore	763	NAR	c. Light Vessel No. 23 ..	599
MXU	b. War Quebec	810	NAS	c. Pensacola, Florida ..	603
MXV	b. Portreath	789	NAT	c. New Orleans	602
MZX	b. Tiverton	803	NAU	c. S. Juan, Porto Rico ..	576
MYA	b. Herefordshire ..	763	NAV	c. Port Royal, South Carolina ..	603
MYB	b. Derbyshire	750	NAW	c. Guantanamo Bay ..	542
MYD	b. Elswick Hall	753	NAX	c. Colon	572
MYE	b. Oxfordshire	785	NAY	c. Point Isabel	603
MYF	b. Chyebassa	741	NAZ	c. Managua	571
MYG	b. Gloucestershire ..	759	NBA	c. Balboa	572
MYH	b. Clearway	747	NBA	c. Darien, Panama	572
MYJ	b. Elwick	753	NBB	c. S. Thomas	607
MYL	b. Leicestershire ..	771	NBD	c. Bar Harbor	592
MYN	b. Tahiti	698	NBE	b. Zeelandia	932
MYN	b. Tahiti	801	NBF	c. Fisherman's Island ..	595
MYO	b. Warwickshire ..	811	NBG	c. Indianhead, Maryland ..	597
MYP	b. Brodmount	737	NBH	b. Rockport	892
MYQ	b. Strombus	799	NBI	b. Alabama NBI	815
MYS	b. S. Silvestre	801	NBJ	b. Albany	815
MYT	b. Hillingdon	763	NBL	b. Alert NBL	815
MYX	b. Laertes	667	NBP	b. Ammon NBP	817
MZB	b. Cardium	739	NBR	b. Annapolis	817
MZC	b. Megantic	777	NBS	c. Siasconsett	605
MZE	b. Akabo	726	NBS	c. Nantucket Island ..	602
MZH	b. Mitra	779	NBU	b. Arethusa	818
MZI	b. Elmina	753			
MZN	b. Natica	781			
MZO	b. Patella	786			
MZP	b. Ranella	792			
MZQ	b. Clan Matheson ..	745			
MZR	b. Carnarvonshire ..	739			
MZV	b. Vita	807			
MZW	b. Nirvana	782			
MZX	c. Chelmsford	586			
MZY	b. Chakdina	739			
MZZ	b. Pasha	786			

		PAGE			PAGE
NBV	b. Arkansas ..	819	NFH	b. Agamennon ..	815
NBW	b. Arizona NBW ..	818	NFI	c. Jacksonville, Florida ..	598
NBX	c. Burrwood NBX ..	593	NFL	c. Cross Island ..	594
NBX	c. Pass A. Loutre ..	603	NFM	b. Fanning ..	845
NBZ	c. Baltimore, Maryland ..	592	NFN	c. Cattle Point, Wash. ..	594
NCA	b. Nevada ..	879	NFO	c. Damiscope Island ..	594
NCB	b. Oklahoma ..	882	NFR	b. Florida NFR ..	846
NCC	b. New York NCC ..	880	NFT	c. New Dungeness ..	602
NCD	b. Texas NCD ..	919	NFT	c. Port Angeles ..	603
NCE	b. Pennsylvania NCE ..	886	NFV	b. Fish Hawk NFV ..	845
NCF	b. Bailey ..	820	NFW	b. Hawk NFW ..	852
NCH	b. Baltimore ..	821	NFX	b. Housatonic ..	855
NCL	b. Beale ..	821	NFZ	b. Rainbow NFZ ..	890
NCN	b. Birmingham ..	823	NGA	b. Columbia NGA ..	832
NCO	b. Arcturus ..	818	NGB	b. Minneapolis ..	875
NCP	b. S.P. 333 ..	901	NGC	b. Boston NGC ..	824
NCR	b. Canandaigua ..	827	NGD	b. Galveston ..	847
NCS	b. Canonicus ..	827	NGE	c. Miami, Florida ..	601
NCU	b. Buffalo ..	826	NGF	b. Georgia NGF ..	849
NCV	b. Burrows ..	826	NGG	b. Olympia NGG ..	883
NCX	b. Dreadnaught ..	839	NGH	b. Glacier ..	849
NCY	b. Caesar ..	827	NGI	b. Chattanooga NGI ..	830
NCZ	c. Cape Henry ..	593	NGJ	b. Goldsborough ..	849
NCZ	c. Hog Island ..	597	NGL	c. Tampa, Florida ..	605
NCZ	c. Smith Island ..	605	NGN	b. Pensacola NGN ..	886
NCZ	c. Virginia Beach ..	605	NGP	b. Beaufort ..	822
NDD	c. Sayville ..	604	NGQ	b. Quincy ..	889
NDB	b. Celtic NDB ..	829	NGR	b. Bridgeport ..	825
NDF	b. California NDF ..	827	NGS	b. Savannah ..	897
NDG	b. Chester ..	830	NGT	c. Mobile, Alabama ..	602
NDH	b. Cheyenne NDH ..	831	NGU	b. Hannibal ..	852
NDI	b. Chicago NDI ..	831	NGV	b. Hartford ..	852
NDJ	b. Gorgona ..	850	NGW	b. Wolverine ..	930
NDK	c. Cape Fear ..	593	NGX	b. Hector NGX ..	853
NDL	c. Ecorse, Michigan ..	595	NGY	b. Helena ..	853
NDM	b. Cleveland ..	832	NGZ	b. Houston ..	855
NDN	b. Pueblo ..	888	NHA	b. Henley ..	853
NDO	b. Comfort ..	833	NHB	c. Fort Morgan, Alabama NHB ..	596
NDQ	b. Connecticut ..	834	NHC	b. Hopkins ..	854
NDU	b. Culgoa ..	836	NHD	b. Monadnock NHD ..	876
NDV	b. S.P. 493 ..	901	NHE	b. Hull ..	855
NDW	c. Cape Hatteras ..	593	NHF	b. Isabel ..	856
NDX	b. Hubbard ..	855	NHI	b. Hancock ..	852
NDX	b. P. A. H. Hubbard ..	884	NHL	c. West Port, Wash. ..	606
NDX	b. S.P. 416 ..	901	NHN	b. Idaho NHN ..	855
NDZ	b. John B. Hinton ..	858	NHO	b. Illinois NHO ..	856
NEC	b. Geo. Washington ..	849	NHT	b. Iowa ..	856
NEE	b. Madawaska NEE ..	871	NHU	b. Roanoke ..	892
NEF	b. Aeolus NEF ..	815	NHV	b. Iroquois NHV ..	856
NEI	b. Susquehanna NEI ..	917	NHW	b. Kittery ..	861
NEJ	b. Leviathan ..	869	NHX	b. Yantic ..	931
NEK	b. Delaware NEK ..	837	NHY	b. Bath ..	821
NEM	b. Denver ..	838	NHZ	b. Newport News ..	879
NEN	b. Des Moines ..	838	NIA	b. Bainbridge ..	820
NEO	b. Stockton ..	903	NIB	b. Jarvis ..	857
NEP	b. Dixie ..	838	NID	b. Jenkins ..	858
NEQ	b. Dolphin NEQ ..	839	NIE	b. Jouett ..	859
NET	c. Drayton ..	839	NIF	b. Carib NIF ..	828
NEV	c. Savannah ..	604	NIF	b. Chauncey ..	830
NEW	b. Lancaster NEW ..	868	NIH	b. Aylwin ..	819
NEX	b. Sea Rover ..	897	NIJ	b. Balch ..	820
NEZ	b. S. Luis ..	918	NIJ	b. Benkam ..	822
NFA	b. Brooklyn ..	825	NIK	b. Cassin ..	829
NFD	b. Elcano ..	843	NIL	b. Cumings ..	836
NFE	b. Charleston ..	830	NIM	b. Cushing NIM ..	836
NFF	c. New Brunswick, New Jersey ..	602	NIN	b. Downes ..	839
NFG	b. President Grant ..	888	NIO	b. Kansas NIO ..	859
NFH	c. Smith Island, Wash. ..	605	NIP	b. Kearsarge ..	860

		PAGE			PAGE
NIQ	b. Kentucky NIQ ..	860	NLU	b. Manzanita ..	872
NIR	b. Duncan ..	839	NLV	b. Sequoia ..	898
NIS	b. Ericsson ..	843	NLW	b. Cedar ..	829
NIT	b. McDougal ..	874	NLX	b. Samar ..	895
NIU	b. Nicholson ..	880	NLY	b. Topeka ..	920
NIV	b. O'Brien NIV ..	882	NMA	b. Nebraska NMA ..	879
NIX	b. Parker ..	885	NMB	c. Maniti ..	542
NIY	b. Lawrence ..	869	NMC	b. Vestal ..	923
NIZ	b. Lebanon NIZ ..	869	NMD	c. Point Hueneme ..	603
NJA	b. Winslow ..	930	NME	b. New Hampshire	
NJB	b. Louisiana NJB ..	870	NME	NME ..	879
NJD	b. Allen ..	816	NMF	b. New Jersey ..	879
NJE	b. Conyngham ..	834	NMG	b. New Orleans ..	879
NJF	b. Davis ..	837	NMH	b. Newport NMH ..	879
NJG	c. San Domingo City ..	580	NMK	b. Aroostook ..	819
NJI	b. Utowanah ..	922	NML	b. Shawmut ..	898
NJJ	b. Wenonah ..	925	NMM	c. Marion NMM ..	601
NJL	b. Maine NJL ..	871	NMN	b. North Carolina ..	881
NJR	b. Mars ..	872	NMO	b. North Dakota ..	881
NJS	b. Frederick ..	847	NMS	b. Neptune NMS ..	879
NJT	b. Massachusetts ..	873	NMT	b. Harvard ..	852
NJU	b. Mayrant ..	873	NMW	b. Ohio ..	882
NJV	b. Mayflower NJV ..	873	NMZ	b. Oregon NMZ ..	883
NJW	b. McCall ..	873	NNA	b. Brutus ..	825
NJX	b. Willoughby ..	929	NNB	b. Jason NNB ..	857
NJY	c. Port Arthur, Texas ..	603	NNC	b. Jupiter NNC ..	859
NJZ	b. Michigan NJZ ..	875	NND	b. Kanawha NND ..	859
NKA	b. Melville NKA ..	874	NNE	b. Maumee ..	873
NKB	c. Galveston ..	597	NNF	b. Nereus ..	879
NKC	c. Navassa Island ..	567	NNG	b. Proteus ..	888
NKD	b. Minnesota NKD ..	875	NNH	b. Leonidas ..	869
NKE	b. Mississippi NKE ..	875	NNI	c. S. Croix ..	607
NKF	b. Missouri NKF ..	875	NNK	b. Nanshan ..	878
NKG	b. Genesee NKG ..	849	NNL	c. Coco Solo ..	572
NKJ	b. Martha Washington ..	873	NNL	b. Sterling NNL ..	903
NKK	b. Mercy ..	874	NNM	b. Saturn ..	897
NKL	b. Monaghan ..	876	NNO	b. Carola IV ..	828
NKM	b. Montana NKM ..	876	NNP	b. Kivasind ..	861
NKN	b. Monterey NKN ..	876	NNQ	b. Corona NNQ ..	835
NKO	b. Wilkes ..	929	NNR	b. Emeline ..	843
NKR	b. Rowan ..	893	NNS	b. Wanderer NNS ..	924
NKS	b. Sampson ..	896	NNT	c. Cape Mala ..	572
NKT	b. Schley ..	897	NNV	b. Sialia ..	898
NKU	b. Shaw ..	898	NNW	c. La Palma ..	572
NKV	b. Tucker ..	921	NNX	b. Undaunted NNX ..	922
NKW	b. Wadsworth ..	923	NNY	b. Gopher ..	850
NKZ	b. Navajo ..	879	NNZ	c. Buffalo, N.Y. ..	593
NLA	c. Light Vessel No. 85 ..	600	NOA	b. Oeceola ..	882
NLC	c. Light Vessel No. 94 ..	601	NOB	b. Abarenda ..	814
NLD	c. Bird Island, Cal. ..	592	NOD	b. Cuyama ..	837
NLD	c. Relief Lightship No. 66 or 85 ..	604	NOE	b. Penobscot ..	886
NLE	c. Relief Lightship No. 71 or 72 ..	604	NOF	c. Anacostia NOF ..	501
NLF	b. Kukui ..	861	NOG	b. Paducah ..	884
NLG	c. Point Reyes ..	603	NOH	b. Henderson ..	853
NLG	c. Relief Lightship No. 53 or 94 ..	604	NOI	b. Bridge ..	825
NLH	c. Point Montara ..	603	NOJ	b. Panther ..	885
NLH	b. Patterson NLH ..	885	NOK	b. Patterson NOK ..	885
NLI	b. Explorer NLI ..	844	NOL	b. Patapsco ..	885
NLJ	b. Pathfinder NLJ ..	885	NOM	b. Patuxent ..	885
NLK	b. Bachs ..	820	NON	b. Paulding ..	885
NLL	b. Columbine NLL ..	833	NOO	b. Porter ..	888
NLM	b. Cypress ..	837	NOP	b. Paul Jones ..	885
NLN	b. Ellington ..	843	NOQ	b. Yale ..	931
NLP	c. Light Vessel No. 81 ..	600	NOS	c. Brunswick ..	593
NLR	b. Roosevelt ..	892	NOT	b. Pittsburgh ..	887
NLT	b. Orchid ..	883	NOU	b. Pocahontas ..	887
			NOW	b. Peoria ..	886
			NOX	b. Perkins ..	886
			NOY	b. Perry ..	886

		PAGE			PAGE
NPA	c. Cordova, Alaska ..	519	NRO	b. Onondaga ..	883
NPB	c. Sitka, Alaska ..	522	NRQ	c. Detroit, Michigan ..	595
NPC	c. Puget Sound ..	604	NRK	b. Pamlico ..	884
NPD	c. Tatoosh ..	605	NRS	b. Seminole NRS ..	897
NPE	c. Fort Stevens NPE ..	596	NRT	b. Little ..	870
NPE	c. North Head ..	603	NRT	b. Thetis NRT ..	920
NPF	c. Marshfield, Oregon ..	601	NRU	b. Acushnet ..	814
NPG	c. Mare Island ..	601	NRW	b. Comanche NRW ..	833
NPB	c. San Francisco ..	604	NRX	b. Unalga ..	922
NPB	c. Yerba Buena, California ..	606	NRV	b. Yamacraw ..	931
NPH	c. San Francisco NPH ..	604	NRZ	c. New London, Connecticut ..	602
NPH	c. Vladivostok ..	579	NSB	b. De Kalb ..	837
NPI	c. Farallons ..	595	NSC	c. Port-au-Prince ..	557
NPB	c. Point Arguello ..	603	NSD	c. Cape May ..	593
NPL	c. S. Diego, California ..	604	NSD	c. Cape Henlopen ..	593
NPM	c. Koko Head NPM ..	556	NSD	c. Bethany Beach, Delaware ..	592
NPM	c. Pearl Harbor ..	556	NSE	b. Tennessee ..	919
NPM	c. Heeia Point ..	556	NSF	c. Anacostia ..	591
NPB	c. Guam ..	565	NSH	b. Manley ..	872
NPO	c. Cavite ..	574	NSI	b. Caldwell ..	827
NPP	c. Peking NPP ..	540	NSK	b. Yankton ..	931
NPQ	c. S. Paul, Alaska ..	521	NSL	c. Lightvessel No. 68 ..	599
NPR	c. Dutch Harbor ..	519	NSL	b. Gloucester NSL ..	849
NPS	c. Kodiak ..	520	NSM	c. Alpena ..	591
NPT	c. Olongapo ..	575	NSM	b. Hawk NSM ..	853
NPU	c. Tutuila ..	579	NSN	b. Conner ..	834
NPV	c. Seward, Alaska ..	522	NSR	c. Frankfort, Michigan ..	597
NPW	c. Eureka, California ..	595	NSR	c. Nasser ..	584
NPX	c. East San Pedro, California ..	595	NSS	c. Annapolis, Maryland ..	591
NPX	c. Point Fermin ..	603	NSS	b. Solace ..	899
NPX	c. S. Pedro Calif. ..	604	NST	b. Vixen ..	923
NPY	c. S. George, Alaska ..	521	NSU	b. Wasp ..	924
NPZ	c. Keyport, Washington ..	598	NSV	b. South Carolina ..	900
NQA	b. Isis NQA ..	857	NSW	b. South Dakota ..	900
NQB	c. Ashtabula ..	591	NSX	c. Grand Haven ..	597
NQE	b. Nahant ..	878	NSY	c. Grand Island ..	597
NQF	b. Pompey ..	887	NSZ	b. Cumberland NSZ ..	836
NQG	b. Callao NQG ..	827	NTB	b. Sterrett ..	903
NQH	b. Concord NQH ..	833	NTD	b. Francis Hackett ..	847
NQJ	b. Isla de Luzon ..	857	NTE	b. Raleigh ..	890
NQK	b. Potomac NQK ..	888	NTF	b. S. Louis NTF ..	918
NQL	b. Machias ..	871	NTG	b. Sonoma NTG ..	900
NQM	b. Prairie ..	888	NTI	b. Adams ..	814
NQQ	b. Monocacy ..	876	NTJ	b. Active ..	814
NQR	b. Prometheus NQR ..	888	NTK	b. Supply ..	916
NQS	b. Palos ..	884	NTL	b. Sylph ..	917
NQT	b. Pampanga ..	884	NTM	c. Ludington, Michigan ..	601
NQU	b. Surveyor ..	916	NTN	b. Fairfax ..	845
NQV	b. Sacramento NQV ..	895	NTO	b. Mohave ..	875
NQX	b. Yorktown ..	931	NTP	b. Salem ..	895
NQZ	b. Quiros ..	889	NTQ	b. S. Francisco NTQ ..	917
NRA	b. Algonquin ..	816	NTR	b. Rochester ..	892
NRB	b. Bear ..	821	NTR	b. Saratoga ..	896
NRC	b. Morrill ..	877	NTT	b. Scorpion ..	897
NRD	b. Androscoggin ..	817	NTU	b. Reid ..	891
NRE	b. Seneca ..	897	NTV	b. Choctaw ..	831
NRE	b. Tallapoosa ..	919	NTW	c. Appledore Island, Maine ..	591
NRF	b. Snohomish ..	899	NTX	b. Rhode Island NTX ..	891
NRG	b. Gresham ..	850	NTY	c. Manitowoc ..	601
NRH	c. Cleveland, Ohio ..	594	NTY	b. Iwana ..	857
NRH	b. McCulloch ..	873	NTZ	b. Roe ..	892
NRI	b. Itasca ..	857	NUA	b. Tacoma NUA ..	919
NRJ	b. Ossipee ..	884	NUB	c. Manistique ..	601
NRK	c. Puerto Obaldia ..	572	NUC	b. Tallahassee ..	919
NRL	b. Tuscarora NRL ..	921	NUD	c. Mackinac Island ..	601
NRM	b. Mohawk NRM ..	875			
NRN	b. Manning ..	872			

		PAGE			PAGE
NUF	c. Benton Harbor ..	592	NYA	b. G.3 ..	847
NUG	c. Calumet ..	593	NYC	b. H.1 ..	851
NUI	b. Terry ..	919	NYD	b. G.4 ..	847
NUK	c. Milwaukee, Wisconsin	602	NYD	b. H.2 ..	851
NUN	b. Tonopah ..	920	NYE	b. H.3 ..	851
NUQ	b. Trippe ..	921	NYF	b. K.1 ..	859
NUR	c. Chicago NUR	594	NYG	b. K.2 ..	859
NUU	b. Samoset ..	667	NYH	b. K.3 ..	859
NUV	b. Sebago ..	897	NYI	b. K.4 ..	859
NUX	c. Duluth, Minnesota	595	NYJ	b. K.5 ..	859
NUX	b. Sotoyomo ..	900	NYK	b. K.6 ..	859
NUY	b. Standish ..	903	NYL	b. K.7 ..	859
NUZ	c. Astoria, Oregon	591	NYM	b. K.8 ..	859
NVD	c. Juneau, Alaska	520	NYN	b. L.1 ..	861
NVE	b. Utah ..	922	NVO	b. L.2 ..	862
NVF	b. Uncas NVF	922	NVP	b. L.3 ..	862
NVH	c. Ketchikan	520	NYQ	b. L.4 ..	862
NVJ	b. Wompatuck	930	NYR	b. L.5 ..	862
NVK	b. Vermont ..	922	NYS	b. L.6 ..	862
NVL	c. Seattle NVL	605	NYT	b. L.7 ..	862
NVM	b. Vesuvius ..	923	NYU	b. L.8 ..	862
NVO	b. Aileen ..	815	NYV	b. L.9 ..	862
NVP	b. Villalobos ..	923	NYW	b. L.10 ..	862
NVR	b. Virginia NVR	923	NYX	b. L.11 ..	862
NVS	b. Farragut ..	845	NYV	b. M.1 ..	870
NVT	b. Vulcan ..	923	NYZ	c. Dry Tortugas,	
NVU	b. Bagley ..	820		Florida ..	595
NVV	b. Barney ..	821	NZC	b. Bushnell ..	826
NVW	b. Biddle ..	823	NZD	b. Fulton NZD	847
NVX	b. Blakely ..	823	NZE	b. N.1 ..	878
NVY	b. Goliath NVY	849	NZF	b. N.2 ..	878
NVZ	b. Dahlgren ..	837	NZG	b. N.3 ..	878
NWB	b. Delong ..	838	NZH	b. N.4 ..	878
NWC	b. Dupont ..	839	NZI	b. N.5 ..	878
NWD	b. Warrington	924	NZJ	b. N.6 ..	878
NWE	b. Washington NWE	924	NZK	b. N.7 ..	878
NWF	b. Foote ..	846	NZL	c. Avalon, California	592
NWG	b. Huntington	855	NZP	c. Bolinas ..	592
NWH	b. Wheeling ..	928	NZQ	b. Mayflower NZQ	873
NWI	b. Whipple ..	928	NZR	c. Cayey ..	576
NWJ	b. Fox ..	847	NZS	c. Fort Stevens	597
NWK	b. Wilmington	929	NZT	c. Baseline Ranger Stn.	592
NWL	b. Walke ..	923	NZU	b. Col. P. S. Miche	833
NWM	b. Wisconsin ..	930	NZW	c. North Island	603
NWN	c. Wilmington North		NZX	b. L. Roscoe ..	870
	Carolina ..	606	NZY	c. Bull Island, South	
NWO	c. Hillcrest ..	597		Carolina ..	593
NWQ	b. Wyoming NWQ	931	NZZ	b. Zizania ..	932
NWR	c. Inglewood, California	597	NABB	b. AA.2 ..	873
NWS	b. Morris ..	877	NABC	b. Niagara NABC	880
NWT	b. Rodgers ..	892	NABG	b. Charles S. Osbourne	830
NWV	b. Somers ..	899	NABJ	c. Lightvessel No. 66	599
NWW	c. Tuckerton, New		NABL	b. Louisville NABL	870
	Jersey ..	605	NABP	b. Anemone ..	817
NWX	b. Thornton ..	920	NABR	b. Samoa ..	895
NWY	b. Tingey ..	920	NABS	b. Tanager ..	919
NXA	c. Chatham NXA	594	NABT	c. Lightvessel No. 93	601
NXO	b. C.5 NXO ..	826	NABV	c. Lightvessel No. 80	600
NXP	b. D.1 ..	837	NABX	c. Lightvessel No. 84	600
NXQ	b. D.2 ..	837	NABZ	b. AA.3 ..	813
NXR	b. D.3 ..	837	NACB	b. Apache NACB	818
NXS	b. E.1 ..	839	NACC	b. Von Stueben	923
NXT	b. E.2 ..	839	NACL	b. Hale ..	852
NXU	b. Azalea ..	810	NACN	b. Dyer ..	839
NXV	b. F.2 ..	844	NACP	b. Stringham ..	904
NXW	b. F.3 ..	844	NACQ	b. McKee ..	874
NXX	b. Tulip ..	921	NACQ	b. Winnisimmet	929
NXY	b. G.1 ..	847	NACR	b. Rathburne ..	891
NXZ	b. G.2 ..	847	NACS	b. Owl ..	884

		PAGE
NALT	b. Ringgold ..	891
NALV	b. Laurel NALV ..	869
NALZ	b. Stoddert ..	903
NAMB	b. Larkspur ..	869
NAMC	b. O.7 ..	881
NAMD	b. Reno NAMD ..	891
NAMG	b. General Alava ..	848
NAMN	b. Narragansett NAMN ..	879
NAMQ	b. Nopatin ..	880
NAMR	b. O.3 ..	881
NAMS	c. Lightvessel No. 74 ..	600
NAMT	b. Boggs ..	823
NAMV	b. Madrona ..	871
NAMX	b. O.4 ..	881
NAMZ	b. O.5 ..	881
NANB	b. O.6 ..	881
NAND	b. O.8 ..	881
NANJ	b. Plattsburg ..	887
NANM	b. Nokomis ..	880
NANP	b. Rambler ..	891
NANQ	b. Robin ..	892
NANS	c. Lightvessel No. 47 ..	599
NANS	b. Mangrove ..	871
NANT	c. Lightvessel No. 5 ..	598
NANZ	b. Farquhar ..	845
NAPG	b. Seattle NAPG ..	897
NAPK	b. Stevens ..	903
NAPL	b. Talbot ..	919
NAPN	b. Teal ..	919
NAPP	c. Lightvessel No. 42 ..	599
NAPR	b. Camden NAPR ..	827
NAPR	b. Ticonderoga ..	920
NAPS	b. Magnolia ..	871
NAPV	b. Maple NAPV ..	872
NAQB	c. Lightvessel No. 20 ..	598
NAQC	b. Piscataqua ..	887
NAQF	b. Widgeon ..	929
NAQJ	b. Rail ..	890
NAQM	b. S.P. 2047 ..	902
NAQN	b. Paul Hamilton ..	885
NAQS	c. Lightvessel No. 3 ..	598
NAQV	b. Marigold ..	872
NARC	b. Maryland NARC ..	873
NARF	b. Wandank ..	924
NARG	b. Chemung ..	830
NARN	b. Montauk ..	876
NARQ	b. Sylvia ..	917
NARR	b. William Jones ..	929
NARS	c. Lightvessel No. 44 ..	599
NART	c. Lightvessel No. 1 ..	598
NARV	c. Lightvessel No. 11 ..	598
NARZ	b. R.20 ..	895
NASB	c. Lightvessel No. 39 ..	599
NASC	c. Lightvessel No. 48 ..	599
NASF	b. S.P. 269 ..	901
NASG	b. Sumac ..	916
NASM	b. O.16 ..	882
NASV	b. R.15 ..	889
NASX	b. R.16 ..	889
NATD	c. Lightvessel No. 9 ..	598
NATF	b. Woolsey ..	930
NATG	b. Bell ..	822
NATJ	b. Wickes ..	929
NATM	b. Woodbury ..	930
NATS	b. Umpqua ..	922
NATT	b. Waters ..	924
NATX	b. Blue Ridge ..	823
NATZ	b. Theodore Roosevelt	919

		PAGE			PAGE
NAVB	<i>b. City of South Haven</i>	832	NEKF	<i>b. Eagle 22</i>	840
NAVC	<i>b. Puritan NAVC</i>	888	NEKG	<i>b. Eagle 23</i>	840
NAVJ	<i>b. Arabia NAVJ</i>	818	NEKJ	<i>b. Eagle 24</i>	840
NAVK	<i>b. S.P. 319</i>	901	NEKK	<i>b. Eagle 25</i>	840
NAVS	<i>b. Stribling</i>	903	NEKM	<i>b. Fearless</i>	845
NAXG	<i>b. Virginian NAXG</i>	923	NEKN	<i>b. Falcon</i>	845
NAXJ	<i>b. Montgomery NAXJ</i>	876	NEKQ	<i>b. Champlin</i>	829
NAXK	<i>b. Murray</i>	877	NEKR	<i>b. Hercules NEKR</i>	853
NAXN	<i>b. Kamaydin</i>	859	NEKS	<i>b. Challenge</i>	829
NAXS	<i>b. O.15</i>	882	NEKZ	<i>b. Manhattan NEKZ</i>	871
NAXT	<i>b. O.10</i>	881	NELG	<i>b. Dorsey</i>	839
NAXV	<i>b. Charles</i>	829	NELJ	<i>b. S.P. 328</i>	901
NAZC	<i>b. Thompson NAZC</i>	920	NELK	<i>b. Pyro</i>	889
NAZJ	<i>c. Lightvessel No. 34</i>	599	NELL	<i>b. Nitro</i>	880
NAZL	<i>b. Lamberton</i>	868	NELN	<i>b. H.8</i>	851
NAZM	<i>b. Kennedy</i>	860	NELX	<i>b. Aaron Ward</i>	813
NAZP	<i>b. Bagaduce</i>	820	NELZ	<i>b. Guard</i>	851
NAZQ	<i>b. Tadousac</i>	919	NEMC	<i>b. Medusa NEMC</i>	874
NAZR	<i>c. Lightvessel No. 46</i>	599	NEMD	<i>b. Sara Thompson</i>	896
NAZS	<i>b. Kalmia</i>	859	NEMG	<i>b. Schench</i>	897
NEBF	<i>b. Constitution</i>	834	NEMJ	<i>b. Herbert</i>	853
NEBJ	<i>b. Meade</i>	874	NEML	<i>b. Branch</i>	824
NEBV	<i>b. H.9</i>	851	NEMS	<i>b. Evans</i>	844
NEBX	<i>b. Edward L. Doheny III</i>	843	NEMT	<i>b. McKean</i>	874
NECD	<i>b. S.P. 2225</i>	902	NEMV	<i>b. Harding</i>	852
NECP	<i>b. Peerless NECP</i>	885	NEMX	<i>b. Gridley</i>	851
NECR	<i>b. Colorado</i>	833	NEMZ	<i>b. Chew</i>	831
NECT	<i>b. Penguin</i>	886	NEND	<i>b. Lake Bloomington</i>	863
NECV	<i>b. Palmer</i>	884	NENG	<i>b. Isreal</i>	857
NEDB	<i>b. Lexington NEDB</i>	869	NENJ	<i>b. Herndon</i>	853
NEDD	<i>b. Durham NEDD</i>	839	NENL	<i>b. Heron</i>	854
NEDF	<i>b. Constellation</i>	834	NENM	<i>b. Dallas NENM</i>	837
NEDG	<i>b. Philip</i>	887	NENN	<i>b. Atlantic NENN</i>	819
NEDJ	<i>b. West Virginia</i>	928	NENS	<i>b. Hazelwood</i>	853
NEDX	<i>b. Nero</i>	879	NENT	<i>b. Williams</i>	929
NEFB	<i>b. Hazelton</i>	853	NENV	<i>b. Hart</i>	852
NEFC	<i>b. H.6</i>	851	NENX	<i>b. Ingraham</i>	856
NEFD	<i>b. S. Eliza</i>	917	NENZ	<i>b. Ludlow</i>	870
NEFL	<i>b. Swallow</i>	917	NEPB	<i>b. Hovey</i>	855
NEFS	<i>b. S.P. 181</i>	900	NEPD	<i>b. Long</i>	870
NEFX	<i>b. Xarifa</i>	931	NEPF	<i>b. Broome</i>	825
NEGC	<i>b. R.18</i>	890	NEPG	<i>b. Maury</i>	873
NEGD	<i>b. Luce</i>	870	NEPS	<i>b. Tattal</i>	919
NEGF	<i>b. Dent</i>	838	NEPT	<i>b. Badger</i>	820
NEGK	<i>b. R.19</i>	890	NEPV	<i>b. Twiggs</i>	911
NEGQ	<i>b. Etin</i>	844	NEPX	<i>b. Babitt</i>	820
NEGS	<i>b. Fortune</i>	846	NEPZ	<i>b. Jacob Jones</i>	857
NEJB	<i>b. Eagle 1</i>	839	NEQF	<i>b. Montcalm NEQF</i>	876
NEJC	<i>b. Eagle 2</i>	839	NEQK	<i>b. Mahan</i>	871
NEJD	<i>b. Eagle 3</i>	839	NEQM	<i>b. H.4</i>	851
NEJF	<i>b. Eagle 4</i>	839	NEQP	<i>b. U.C.97</i>	922
NEJG	<i>b. Eagle 5</i>	839	NEQQ	<i>b. Beaver NEQQ</i>	822
NEJJ	<i>b. Eagle 6</i>	839	NEQS	<i>b. Buchanan</i>	825
NEJK	<i>b. Eagle 7</i>	839	NEQT	<i>b. Tillman</i>	920
NEJL	<i>b. Eagle 8</i>	839	NEQX	<i>b. Kennison</i>	860
NEJM	<i>b. Eagle 9</i>	839	NEQZ	<i>b. Claxton</i>	832
NEJN	<i>b. Eagle 10</i>	840	NERB	<i>b. Gilmer</i>	849
NEJP	<i>b. Eagle 11</i>	840	NERD	<i>b. U.148</i>	921
NEJO	<i>b. Eagle 12</i>	840	NERG	<i>b. Aulick</i>	819
NEJR	<i>b. Eagle 13</i>	840	NERJ	<i>b. Craven</i>	835
NEJS	<i>b. Eagle 14</i>	840	NERL	<i>b. Lansdale</i>	868
NEJT	<i>b. Eagle 15</i>	840	NERO	<i>b. Turner</i>	921
NEJV	<i>b. Eagle 16</i>	840	NERP	<i>b. S.P. 1138</i>	902
NEJX	<i>b. Eagle 16</i>	840	NERR	<i>b. Gillis</i>	849
NEJZ	<i>b. Eagle 18</i>	840	NERS	<i>b. Upshur</i>	922
NEKB	<i>b. Eagle 19</i>	840	NERT	<i>b. Greer</i>	850
NEKC	<i>b. Eagle 20</i>	840	NERV	<i>b. Elliot</i>	843
NEKD	<i>b. Eagle 21</i>	840	NERX	<i>b. Roper</i>	892
			NERZ	<i>b. Breckinridge</i>	825

		PAGE			PAGE
NESB	b. S.P. Lee	903	NIBF	b. Eagle 40	841
NESD	b. U.B. 88	921	NIBG	b. Eagle 35	841
NESG	b. Young	931	NIBJ	b. Eagle 41	841
NESJ	b. H.7	851	NIBK	b. Eagle 36	841
NESM	b. Breese	825	NIBL	b. Eagle 42	841
NESN	b. Osborne	883	NIBM	b. Eagle 37	841
NESS	b. Bernadon	823	NIBN	b. Eagle 38	841
NEST	b. Cole	833	NIBP	b. Eagle 43	841
NESV	b. Thatcher	919	NIBQ	b. Eagle 44	841
NESX	b. Walker	924	NIBR	b. Eagle 45	841
NESZ	b. Crosby	836	NIBS	b. Eagle 46	841
NETB	b. McFarland	874	NIBT	b. Eagle 47	841
NETD	b. Mahopac NETD ..	871	NIBV	b. Eagle 48	841
NETF	b. Lea	869	NIBX	b. Eagle 49	841
NETG	b. H.5	851	NIBZ	b. Eagle 50	841
NETI	b. O.2	881	NICB	b. Eagle 51	841
NETK	b. O.11	881	NICC	b. Eagle 52	841
NETL	b. O.12	881	NICD	b. Eagle 53	841
NETP	b. Lake Weston	868	NICF	b. Eagle 54	841
NETQ	b. Tatnuck	919	NICG	b. Eagle 55	841
NETS	b. Meredith	874	NICJ	b. Eagle 56	841
NETT	b. Bush	826	NICK	b. Eagle 57	842
NETV	b. Cowell	835	NICL	b. Eagle 58	842
NETX	b. Maddox	871	NICM	b. Eagle 59	842
NETZ	b. Koka	861	NICN	b. Eagle 60	842
NEVB	b. Sunmadin	916	NIFB	b. Crane NIFB	835
NEVC	b. Napa	878	NIFC	b. Ramsey NIFC	891
NEVD	b. O.14	882	NIFD	b. Ellis NIFD	843
NEVG	b. U.111	921	NIFG	b. Fuller	847
NEVK	b. Sciota	897	NIFJ	b. Percival	886
NEVL	b. Pinola	887	NIFL	b. Hamilton NIFL ..	852
NEVM	b. Oriole	883	NIFM	b. Howard NIFM	855
NEVP	b. Algorma	816	NIFN	b. Thomas NIFN	920
NEVQ	b. Carrabasset	828	NIFP	b. Neches	879
NEVR	b. Iuka	857	NIFQ	b. Pecos	885
NEVS	b. Anthony	817	NIGB	b. McCook	873
NEVT	b. Sproston	903	NIGC	b. McCalla	873
NEVV	b. Rizal	892	NIGD	b. Kalk	859
NEVX	b. Machenzie	871	NIGF	b. Ingram	856
NEVZ	b. Renshaw	891	NIGG	b. McDermut	873
NEXB	b. Radford	890	NIGJ	b. Laub	869
NEXC	b. Kecanqua	860	NIGK	b. McLanahan	874
NEXF	b. Eagle 26	840	NIGL	b. Edwards	843
NEXG	b. Eagle 27	840	NIGN	b. Ballard	820
NEXJ	b. O.1	881	NIGP	b. Swasey	917
NEXK	b. U.117	921	NIGQ	b. John Francis Burns	858
NEXM	b. Eagle 28	840	NIGR	b. Fred J. Talbot ..	847
NEXN	b. Eagle 29	841	NIGS	b. Yarnall	931
NEXP	b. Eagle 30	841	NIJB	b. Curlew	836
NEXR	b. Mugford	877	NIJF	b. Turkey	921
NEXS	b. O'Bannon	882	NIJG	b. Partridge	885
NEXT	b. Hogan	854	NIJJ	b. Bobolink	823
NEXV	b. Stansbury	903	NIJK	b. Lark	869
NEXX	b. Hopewell	854	NIJL	b. Osprey	883
NEXZ	b. Haraden	852	NIJM	b. Seagull	897
NEZG	b. Eagle 31	841	NIJN	b. Flamingo	845
NEZJ	b. Eagle 32	841	NIJP	b. Swan NIJP	917
NEZN	b. O.13	882	NIJQ	b. Whippoorwill ..	928
NEZP	b. Tarbell	919	NIJR	b. Bittern	823
NEZQ	b. Delphy	838	NIJS	b. Sanderling	896
NEZR	b. Gamble	847	NIJT	b. Auk	819
NEZS	b. Abbot	814	NIJV	b. Chewink	831
NEZT	b. Clemson	832	NIJX	b. Gannet	848
NEZV	b. Hatfield	852	NIKB	b. Mallard NIKB ..	871
NEZX	b. Brooks	825	NIKC	b. Ortolan	883
NEZZ	b. Belknap	822	NIKD	b. Peacock	885
NIBB	b. Eagle 33	841	NIKF	b. Pigeon NIKF ..	887
NIBC	b. Eagle 39	841	NIKG	b. Redwing	891
NIBD	b. Eagle 34	841	NIKK	b. Sandpiper	896

		PAGE			PAGE
NIKL	<i>b. Vireo</i>	923	NIPG	<i>b. S.37</i>	894
NIKM	<i>b. Warbler</i>	924	NIPJ	<i>b. S.38</i>	894
NIKN	<i>b. Willet</i>	929	NIPK	<i>b. S.39</i>	894
NIKP	<i>b. Woodcock</i> NIKP ..	930	NIPL	<i>b. S.40</i>	894
NIKQ	<i>b. Quail</i>	889	NIPM	<i>b. S.41</i>	895
NIKR	<i>b. Eider</i> NIKR	843	NIPN	<i>b. S.42</i>	895
NIKS	<i>b. Thrush</i>	920	NIPP	<i>b. S.43</i>	895
NIKT	<i>b. Tern</i> NIKT	919	NIPQ	<i>b. S.44</i>	895
NIKV	<i>b. Cormorant</i> NIKV ..	834	NIPR	<i>b. S.45</i>	895
NIKX	<i>b. Grebe</i> NIKX	850	NIPS	<i>b. S.46</i>	895
NIKZ	<i>b. Raven</i> NIKZ	891	NIPT	<i>b. S.47</i>	895
NILB	<i>b. AA.1</i>	813	NIPV	<i>b. S.48</i>	895
NILC	<i>b. R.1</i>	889	NIPX	<i>b. S.49</i>	895
NILD	<i>b. R.2</i>	889	NIPZ	<i>b. S.50</i>	895
NILF	<i>b. R.3</i>	889	NIQB	<i>b. Sub-chaser</i> 425 ..	915
NILG	<i>b. R.4</i>	889	NIQC	<i>b. Sub-chaser</i> 426 ..	915
NILJ	<i>b. R.5</i>	889	NIQD	<i>b. Sub-chaser</i> 427 ..	915
NILK	<i>b. R.6</i>	889	NIQF	<i>b. Sub-chaser</i> 428 ..	915
NILL	<i>b. R.7</i>	889	NIQG	<i>b. Sub-chaser</i> 429 ..	915
NILM	<i>b. R.8</i>	889	NIQJ	<i>b. Sub-chaser</i> 430 ..	915
NILN	<i>b. R.9</i>	889	NIQK	<i>b. S.51</i>	895
NILP	<i>b. R.10</i>	889	NIQL	<i>b. Sub-chaser</i> 432 ..	915
NILQ	<i>b. R.11</i>	889	NIQN	<i>b. Sub-chaser</i> 434 ..	915
NILR	<i>b. R.12</i>	889	NIQP	<i>b. Sub-chaser</i> 435 ..	915
NILS	<i>b. R.13</i>	889	NIQQ	<i>b. Sub-chaser</i> 436 ..	915
NILT	<i>b. R.14</i>	889	NIQT	<i>b. Sub-chaser</i> 439 ..	915
NILV	<i>b. R.21</i>	890	NIQV	<i>b. Sub-chaser</i> 440 ..	915
NILX	<i>b. R.22</i>	890	NIQX	<i>b. Sub-chaser</i> 441 ..	915
NILZ	<i>b. R.23</i>	890	NIQZ	<i>b. Sub-chaser</i> 442 ..	915
NIMB	<i>b. R.24</i>	890	NIRB	<i>b. Sub-chaser</i> 443 ..	916
NIMC	<i>b. R.25</i>	890	NIRC	<i>b. Sub-chaser</i> 444 ..	916
NIMD	<i>b. R.26</i>	890	NIRD	<i>b. Sub-chaser</i> 445 ..	916
NIMF	<i>b. R.27</i>	890	NIRF	<i>b. Sub-chaser</i> 446 ..	916
NIMG	<i>b. S.1</i>	893	NIRG	<i>b. Sub-chaser</i> 447 ..	916
NIMJ	<i>b. S.2</i>	893	NIRJ	<i>b. Sub-chaser</i> 448 ..	916
NIMK	<i>b. S.3</i>	893	NITQ	<i>c. Lightvessel</i> No. 72 ..	600
NIML	<i>b. S.4</i>	893	NIVB	<i>b. Moblie</i>	875
NIMM	<i>b. S.5</i>	893	NIVC	<i>b. Patricia</i> NIVC ..	885
NIMN	<i>b. S.6</i>	893	NIVD	<i>b. Cap Finistere</i> ..	827
NIMP	<i>b. S.7</i>	893	NIVF	<i>b. Graf Waldersee</i> ..	850
NIMQ	<i>b. S.8</i>	893	NIVG	<i>b. Pretoria</i>	888
NIMR	<i>b. S.9</i>	893	NIVJ	<i>b. Kaiserin Augusta</i> Victoria	859
NIMS	<i>b. S.10</i>	893	NIVK	<i>b. Zeppelin</i>	932
NIMT	<i>b. S.11</i>	893	NIVL	<i>b. Prinz Fred. Wilhelm</i> ..	888
NIMV	<i>b. S.12</i>	893	NIVM	<i>b. Imperator</i>	356
NIMX	<i>b. S.13</i>	893	NOB3	<i>b. Sub-chaser</i> 1	904
NIMZ	<i>b. S.14</i>	893	NOB3	<i>b. Sub-chaser</i> 2	904
NINB	<i>b. S.15</i>	893	NOBD	<i>b. Sub-chaser</i> 3	904
NINC	<i>b. S.16</i>	893	NOBF	<i>b. Sub-chaser</i> 4	904
NIND	<i>b. S.17</i>	893	NOBJ	<i>b. Sub-chaser</i> 17	904
NINF	<i>b. S.18</i>	893	NOBK	<i>b. Sub-chaser</i> 18	904
NING	<i>b. S.19</i>	893	NOBL	<i>b. Sub-chaser</i> 19	904
NINJ	<i>b. S.20</i>	893	NOBM	<i>b. Sub-chaser</i> 20	904
NINK	<i>b. S.21</i>	893	NOBN	<i>b. Sub-chaser</i> 21	904
NINL	<i>b. S.22</i>	894	NOBP	<i>b. Sub-chaser</i> 22	904
NINM	<i>b. S.23</i>	894	NOBQ	<i>b. Sub-chaser</i> 23	904
NINN	<i>b. S.24</i>	894	NOBR	<i>b. Sub-chaser</i> 24	904
NINP	<i>b. S.25</i>	894	NOBS	<i>b. Sub-chaser</i> 25	904
NINQ	<i>b. S.26</i>	894	NOBT	<i>b. Sub-chaser</i> 26	904
NINR	<i>b. S.27</i>	894	NOBV	<i>b. Sub-chaser</i> 27	904
NINS	<i>b. S.28</i>	894	NOBZ	<i>b. Sub-chaser</i> 35	904
NINT	<i>b. S.29</i>	894	NOCB	<i>b. Sub-chaser</i> 36	904
NINV	<i>b. S.30</i>	894	NOCC	<i>b. Sub-chaser</i> 37	905
NINX	<i>b. S.31</i>	894	NOCD	<i>b. Sub-chaser</i> 38	905
NINZ	<i>b. S.32</i>	894	NOCG	<i>b. Sub-chaser</i> 40	905
NIPB	<i>b. S.33</i>	894	NOCK	<i>b. Sub-chaser</i> 42	905
NIPC	<i>b. S.34</i>	894	NOCL	<i>b. Sub-chaser</i> 43	905
NIPD	<i>b. S.35</i>	894	NOCM	<i>b. Sub-chaser</i> 44	905
NIPF	<i>b. S.36</i>	894			

				PAGE					PAGE
NOCN	b. Sub-chaser	45	..	905	NOKZ	b. Sub-chaser	152	..	908
NOCO	b. Sub-chaser	47	..	905	NOLB	b. Sub-chaser	153	..	908
NOCP	b. Sub-chaser	46	..	905	NOLC	b. Sub-chaser	154	..	908
NOCR	b. Sub-chaser	48	..	905	NOLD	b. Sub-chaser	155	..	908
NOCS	b. Sub-chaser	49	..	905	NOLF	b. Sub-chaser	156	..	908
NOCT	b. Sub-chaser	50	..	905	NOLJ	b. Sub-chaser	158	..	908
NOCV	b. Sub-chaser	51	..	905	NOLK	b. Sub-chaser	159	..	908
NOCX	b. Sub-chaser	52	..	905	NOLL	b. Sub-chaser	164	..	908
NO CZ	b. Sub-chaser	53	..	905	NOLM	b. Sub-chaser	165	..	908
NODB	b. Sub-chaser	54	..	905	NOLN	b. Sub-chaser	166	..	908
NODC	b. Sub-chaser	55	..	905	NOLP	b. Sub-chaser	167	..	908
NODD	b. Sub-chaser	56	..	905	NOLQ	b. Sub-chaser	168	..	908
NODF	b. Sub-chaser	57	..	905	NOLR	b. Sub-chaser	177	..	908
NODG	b. Sub-chaser	58	..	905	NOLS	b. Sub-chaser	178	..	908
NODM	b. Sub-chaser	62	..	905	NOLV	b. Sub-chaser	180	..	908
NODN	b. Sub-chaser	63	..	905	NOLX	b. Sub-chaser	181	..	908
NODP	b. Sub-chaser	64	..	905	NOLZ	b. Sub-chaser	182	..	908
NODQ	b. Sub-chaser	68	..	905	NOMB	b. Sub-chaser	183	..	908
NODR	b. Sub-chaser	69	..	905	NOMC	b. Sub-chaser	184	..	908
NODS	b. Sub-chaser	70	..	905	NOMD	b. Sub-chaser	185	..	909
NODT	b. Sub-chaser	71	..	905	NOMF	b. Sub-chaser	186	..	909
NODV	b. Sub-chaser	72	..	905	NOMG	b. Sub-chaser	187	..	909
NODX	b. Sub-chaser	73	..	906	NOMJ	b. Sub-chaser	188	..	909
NODZ	b. Sub-chaser	74	..	906	NOMK	b. Sub-chaser	189	..	909
NOFB	b. Sub-chaser	77	..	906	NOML	b. Sub-chaser	190	..	909
NOFJ	b. Sub-chaser	82	..	906	NOMM	b. Sub-chaser	191	..	909
NOFS	b. Sub-chaser	90	..	906	NOMN	b. Sub-chaser	192	..	909
NOFT	b. Sub-chaser	91	..	906	NOMP	b. Sub-chaser	193	..	909
NOFX	b. Sub-chaser	93	..	906	NOMQ	b. Sub-chaser	194	..	909
NOGB	b. Sub-chaser	95	..	906	NOMR	b. Sub-chaser	195	..	909
NOGC	b. Sub-chaser	96	..	906	NOMS	b. Sub-chaser	196	..	909
NOGD	b. Sub-chaser	97	..	906	NOMV	b. Sub-chaser	198	..	909
NOGF	b. Sub-chaser	98	..	906	NOMX	b. Sub-chaser	199	..	909
NOGG	b. Sub-chaser	99	..	906	NONF	b. Sub-chaser	204	..	909
NOGJ	b. Sub-chaser	100	..	906	NONJ	b. Sub-chaser	206	..	909
NOGK	b. Sub-chaser	101	..	906	NONK	b. Sub-chaser	207	..	909
NOGL	b. Sub-chaser	102	..	906	NONL	b. Sub-chaser	208	..	909
NOGM	b. Sub-chaser	103	..	906	NONM	b. Sub-chaser	209	..	909
NOGN	b. Sub-chaser	104	..	906	NONN	b. Sub-chaser	210	..	909
NOGP	b. Sub-chaser	105	..	906	NONP	b. Sub-chaser	211	..	909
NOGQ	b. Sub-chaser	106	..	906	NONQ	b. Sub-chaser	212	..	909
NOGR	b. Sub-chaser	107	..	907	NONR	b. Sub-chaser	213	..	909
NOGT	b. Sub-chaser	109	..	907	NONS	b. Sub-chaser	214	..	909
NOGV	b. Sub-chaser	110	..	907	NONT	b. Sub-chaser	215	..	909
NOGX	b. Sub-chaser	111	..	907	NONV	b. Sub-chaser	216	..	909
NOJF	b. Sub-chaser	116	..	907	NONX	b. Sub-chaser	217	..	909
NOJG	b. Sub-chaser	117	..	907	NONZ	b. Sub-chaser	218	..	909
NOJJ	b. Sub-chaser	118	..	907	NOPB	b. Sub-chaser	220	..	910
NOJK	b. Sub-chaser	119	..	907	NOPC	b. Sub-chaser	221	..	910
NOJL	b. Sub-chaser	120	..	907	NOPD	b. Sub-chaser	222	..	910
NOJM	b. Sub-chaser	121	..	907	NOPF	b. Sub-chaser	223	..	910
NOJP	b. Sub-chaser	123	..	907	NOPG	b. Sub-chaser	224	..	910
NOJR	b. Sub-chaser	125	..	907	NOPJ	b. Sub-chaser	225	..	910
NOJS	b. Sub-chaser	126	..	907	NOPK	b. Sub-chaser	226	..	910
NOJV	b. Sub-chaser	128	..	907	NOPM	b. Sub-chaser	228	..	910
NOJX	b. Sub-chaser	129	..	907	NOPN	b. Sub-chaser	229	..	910
NOKC	b. Sub-chaser	132	..	907	NOPP	b. Sub-chaser	230	..	910
NOKD	b. Sub-chaser	133	..	907	NOPO	b. Sub-chaser	231	..	910
NOKF	b. Sub-chaser	134	..	907	NOPR	b. Sub-chaser	232	..	910
NOKG	b. Sub-chaser	135	..	907	NOPS	b. Sub-chaser	233	..	910
NOKJ	b. Sub-chaser	136	..	907	NOPT	b. Sub-chaser	234	..	910
NOKK	b. Sub-chaser	137	..	907	NOPV	b. Sub-chaser	235	..	910
NOKL	b. Sub-chaser	138	..	907	NOPIX	b. Sub-chaser	236	..	910
NOKM	b. Sub-chaser	139	..	907	NOPIZ	b. Sub-chaser	237	..	910
NOKN	b. Sub-chaser	143	..	907	NOQB	b. Sub-chaser	238	..	910
NOKP	b. Sub-chaser	144	..	907	NOQC	b. Sub-chaser	239	..	910
NOKQ	b. Sub-chaser	145	..	907	NOQD	b. Sub-chaser	240	..	911
NOKR	b. Sub-chaser	147	..	907	NOQF	b. Sub-chaser	241	..	911
NOKS	b. Sub-chaser	148	..	907	NOQD	b. Sub-chaser	242	..	911

				PAGE					PAGE
NOOG	b. Sub-chaser	244	..	911	NOVP	b. Sub-chaser	329	..	913
NOQK	b. Sub-chaser	245	..	911	NOVQ	b. Sub-chaser	330	..	913
NOQL	b. Sub-chaser	246	..	911	NOVR	b. Sub-chaser	331	..	913
NOQM	b. Sub-chaser	247	..	911	NOVS	b. Sub-chaser	332	..	914
NOQN	b. Sub-chaser	248	..	911	NOVT	b. Sub-chaser	333	..	914
NOQP	b. Sub-chaser	250	..	911	NOVV	b. Sub-chaser	334	..	914
NOQQ	b. Sub-chaser	251	..	911	NOVX	b. Sub-chaser	335	..	914
NOQS	b. Sub-chaser	253	..	911	NOVZ	b. Sub-chaser	336	..	914
NOQT	b. Sub-chaser	254	..	911	NOXC	b. Sub-chaser	338	..	914
NOQV	b. Sub-chaser	255	..	911	NOXD	b. Sub-chaser	339	..	914
NOQX	b. Sub-chaser	256	..	911	NOXF	b. Sub-chaser	340	..	914
NOQZ	b. Sub-chaser	257	..	911	NOXG	b. Sub-chaser	341	..	914
NORB	b. Sub-chaser	258	..	911	NOXQ	b. Sub-chaser	351	..	914
NORC	b. Sub-chaser	259	..	911	NOXR	b. Sub-chaser	352	..	914
NORD	b. Sub-chaser	260	..	911	NOXS	b. Sub-chaser	353	..	914
NORF	b. Sub-chaser	261	..	911	NOXT	b. Sub-chaser	354	..	914
NORG	b. Sub-chaser	262	..	911	NOXX	b. Sub-chaser	356	..	914
NORJ	b. Sub-chaser	263	..	911	NOXZ	b. Sub-chaser	405	..	914
NORK	b. Sub-chaser	264	..	911	NOZB	b. Sub-chaser	407	..	914
NORL	b. Sub-chaser	265	..	911	NOZC	b. Sub-chaser	408	..	914
NORM	b. Sub-chaser	266	..	911	NOZD	b. Sub-chaser	409	..	914
NORP	b. Sub-chaser	268	..	911	NOZF	b. Sub-chaser	410	..	914
NORQ	b. Sub-chaser	269	..	911	NOZG	b. Sub-chaser	411	..	915
NORR	b. Sub-chaser	270	..	911	NOZJ	b. Sub-chaser	412	..	915
NORS	b. Sub-chaser	271	..	911	NOZK	b. Sub-chaser	413	..	915
NORT	b. Sub-chaser	272	..	912	NOZL	b. Sub-chaser	414	..	915
NORV	b. Sub-chaser	273	..	912	NOZM	b. Sub-chaser	415	..	915
NORX	b. Sub-chaser	274	..	912	NOZN	b. Sub-chaser	416	..	915
NORZ	b. Sub-chaser	275	..	912	NOZP	b. Sub-chaser	417	..	915
NOSB	b. Sub-chaser	276	..	912	NOZQ	b. Sub-chaser	418	..	915
NOSC	b. Sub-chaser	277	..	912	NOZR	b. Sub-chaser	419	..	915
NOSD	b. Sub-chaser	278	..	912	NOZS	b. Sub-chaser	420	..	915
NOSF	b. Sub-chaser	279	..	912	NOZT	b. Sub-chaser	421	..	915
NOSG	b. Sub-chaser	280	..	912	NOZV	b. Sub-chaser	422	..	915
NOSJ	b. Sub-chaser	281	..	912	NOZX	b. Sub-chaser	423	..	915
NOSK	b. Sub-chaser	282	..	912	NOZZ	b. Sub-chaser	424	..	915
NOSL	b. Sub-chaser	283	..	912	NUBB	b. S.P.	43	..	900
NOSM	b. Sub-chaser	284	..	912	NUBC	b. S.P.	909	..	902
NOSQ	b. Sub-chaser	287	..	912	NUBD	b. S.P.	585	..	901
NOSR	b. Sub-chaser	288	..	912	NUBG	b. S.P.	563	..	901
NOSS	b. Sub-chaser	289	..	912	NUBJ	b. S.P.	691	..	902
NOST	b. Sub-chaser	290	..	912	NUBK	b. S.P.	54	..	900
NOSV	b. Sub-chaser	291	..	912	NUBN	b. S.P.	411	..	901
NOSX	b. Sub-chaser	292	..	912	NUBQ	b. S.P.	463	..	901
NOSZ	b. Sub-chaser	293	..	913	NUBR	b. S.P.	3297	..	903
NOTB	b. Sub-chaser	294	..	913	NUBS	b. S.P.	726	..	902
NOTC	b. Sub-chaser	295	..	913	NUBT	b. S.P.	522	..	901
NOTD	b. Sub-chaser	296	..	913	NUBV	b. S.P.	572	..	901
NOTG	b. Sub-chaser	298	..	913	NUBZ	b. S.P.	340	..	901
NOTI	b. Sub-chaser	299	..	913	NUCB	b. S.P.	582	..	901
NOTK	b. Sub-chaser	300	..	913	NUCC	b. S.P.	738	..	902
NOTL	b. Sub-chaser	301	..	913	NUCD	b. S.P.	533	..	901
NOTM	b. Sub-chaser	302	..	913	NUCF	b. Lilac	..	..	869
NOTN	b. Sub-chaser	303	..	913	NUCG	b. S.P.	573	..	901
NOTP	b. Sub-chaser	304	..	913	NUCJ	b. S.P.	1234	..	902
NOTQ	b. Sub-chaser	305	..	913	NUCK	b. S.P.	765	..	902
NOTR	b. Sub-chaser	306	..	913	NUCM	b. S.P.	206	..	900
NOTS	b. Sub-chaser	307	..	913	NUCN	b. S.P.	599	..	901
NOTT	b. Sub-chaser	308	..	913	NUCP	b. S.P.	967	..	902
NOTV	b. Sub-chaser	309	..	913	NUCQ	b. S.P.	516	..	901
NOTX	b. Sub-chaser	310	..	913	NUCS	b. S.P.	642	..	902
NOTZ	b. Sub-chaser	311	..	913	NUCT	b. S.P.	265	..	901
NOVB	b. Sub-chaser	312	..	913	NUCX	b. S.P.	214	..	900
NOVC	b. Sub-chaser	320	..	913	NUCZ	b. S.P.	249	..	901
NOVD	b. Sub-chaser	321	..	913	NUDB	b. S.P.	191	..	900
NOVF	b. Sub-chaser	322	..	913	NUDC	b. S.P.	666	..	902
NOVG	b. Sub-chaser	323	..	913	NUDD	b. S.P.	517	..	901
NOVL	b. Sub-chaser	326	..	913	NUDF	b. S.P.	179	..	900
NOVN	b. Sub-chaser	328	..	913	NUDG	b. S.P.	237	..	900

		PAGE		PAGE	
NUDK	b. S.P. 2373 ..	902	NULV	b. Sharkey ..	898
NUDN	b. S.P. 238 ..	901	NULX	b. Toucey ..	921
NUDP	b. S.P. 617 ..	902	NULZ	b. Breck ..	825
NUDP	b. Yacona ..	931	NUMB	b. Zeilin ..	932
NUDR	b. S.P. 707 ..	902	NUMC	b. Yarbrough	
NUDV	b. S.P. 510 ..	901	NUMC	NUMC ..	931
NUDX	b. S.P. 525 ..	901	NUMF	b. Wood ..	930
NUDZ	b. S.P. 210 ..	900	NUMG	b. Marcus ..	872
NUFB	b. Mohawk NUFB	875	NUMJ	b. Murvine ..	877
NUFC	b. S.P. 1240 ..	902	NUMK	b. Chase ..	830
NUFD	b. S.P. 336 ..	901	NUML	b. Mullany ..	877
NUFF	b. S.P. 267 ..	901	NUMM	b. Litchfield ..	870
NUFG	b. S.P. 399 ..	901	NUMN	b. Zane ..	931
NUFJ	b. S.P. 311 ..	901	NUMP	b. Trevor ..	921
NUFK	b. S.P. 103 ..	900	NUMQ	b. William B. Preston	929
NUFL	b. S.P. 838 ..	902	NUMZ	b. Kankanksee ..	859
NUFM	b. Sunflower ..	916	NUNB	b. Yocona ..	931
NUFN	b. S.P. 1149 ..	902	NURX	b. Humphreys ..	855
NUFP	b. S.P. 1047 ..	902	OK	c. Neuenmunster	554
NUFX	b. Wissahickon ..	930	OAA	c. Callao ..	573
NUFZ	b. S.P. 185 ..	900	OAB	c. Cachendo ..	573
NUGB	b. S.P. 3218 ..	903	OAC	c. Chala ..	573
NUGC	c. University of Florida	605	OAE	c. Puerto Bermudez ..	573
NUGD	b. Machinac ..	871	OAG	c. Eten ..	573
NUGJ	b. Alameda NUGJ	815	OAL	c. Ilo ..	573
NUGL	b. Laramie ..	869	OAM	c. Massisea ..	573
NUGM	b. Mattole ..	873	OAO	c. Orellana ..	573
NUGN	b. Patoka ..	885	OAP	c. Pisco ..	573
NUGP	b. Ramapo ..	890	OAQ	c. Requenna ..	574
NUGQ	b. Rapidan NUGQ	891	OAT	c. Trujillo ..	574
NUGR	b. Salinas ..	895	OAU	c. Putumayo ..	574
NUGS	b. Sapelo ..	896	OAY	c. Iquitos ..	573
NUGT	b. Sepulga ..	897	OAZ	c. San Cristobal (Lima)	574
NUGV	b. Tippicanoe ..	920	OCA	b. Moora ..	779
NUGX	b. Trinity ..	921	OCB	b. Luchana ..	773
NUJB	b. Chesapeake ..	830	OCC	b. Jeseric ..	767
NUJD	b. Abel P. Upshur ..	814	OCD	b. Irisnere ..	766
NUJF	b. Hunt ..	855	OCD	b. Kincardine ..	769
NUJG	b. Geo. E. Badger ..	849	OCE	b. Grebe ..	761
NUJJ	b. Smith Thompson ..	899	OCF	b. Fernfield ..	756
NUJK	b. Barker ..	821	OCG	b. Dunbridge ..	751
NUJL	b. Tracey ..	921	OCH	b. Huallaga ..	702
NUJN	b. Overton ..	884	OCH	b. Cheniston ..	740
NUJP	b. Sturtevant ..	904	OCI	b. Maureen ..	777
NUJQ	b. Henshaw ..	853	OCJ	b. Ernemore ..	754
NUJR	b. Meyer ..	875	OCK	b. Novo ..	783
NUJS	b. Doyen ..	839	OCL	b. Pangbourne ..	785
NUJT	b. Valette NUJT (La)	922	OCM	b. Mantaro ..	702
NUJV	b. Shirk ..	898	OCM	b. Mahratta ..	774
NUJX	b. Kidder ..	861	OCN	b. Phoebe ..	787
NUJZ	b. Selfridge ..	897	OCO	b. Pundit ..	791
NUKB	b. Robert Smith ..	892	OCP	b. War Sepoy ..	810
NUKC	b. Wasmuth ..	924	OCQ	b. Tosto ..	804
NUKD	b. Hulbert ..	855	OCR	b. Urubamba ..	702
NUKF	b. Noa ..	880	OCS	b. Rondo OCS	794
NUKM	b. Nahunta ..	878	OCU	b. Ucayala ..	702
NUKN	b. Old Dominion ..	883	OCU	b. Lynntown ..	773
NUKS	b. Winchester ..	929	OCV	b. Winkfield ..	812
NULF	b. Wainwright ..	923	OCW	b. Taransay ..	802
NULJ	b. Welborn C. Wood ..	925	OCY	b. Gracefield ..	760
NULK	b. Alden ..	816	OCZ	b. Promus ..	791
NULL	b. Borie ..	824	ODA	b. Glen Head ..	759
NULM	b. Kane ..	859	ODB	b. Peebles ..	786
NULN	b. Childs ..	831	ODC	b. Sotero ..	799
NULP	b. King ..	861	ODD	b. Baron Douglas ..	731
NULQ	b. Sands ..	896	ODE	b. Dallington ..	749
NULR	b. Sinclair ..	899	ODF	b. Indianola ..	766
NULS	b. McCawley ..	873	ODG	b. Inkula ..	766
NULT	b. Moody ..	876	ODH	b. Neebing ..	781

		PAGE			PAGE
ODI	b. Winterton ..	812	ONV	b. Anversville ..	613
ODJ	b. Douro ODJ ..	751	OOA	b. Anversoise ..	613
ODK	b. Bury ..	737	OOB	b. Belgier ..	613
ODL	b. Kolpino ..	770	OOC	b. Colombier ..	613
ODM	b. Kotka ..	770	OOD	b. Delos ..	613
ODN	b. Kovno ..	770	OOE	b. Eglantier ..	613
ODO	b. Livorno ..	772	OOF	b. Comte de Flandre ..	613
ODP	b. Narva ..	781	OOG	b. Gantoise ..	613
ODQ	b. Wolverton ..	812	OOI	b. Italier ..	613
ODR	b. Scipio ..	796	OOK	b. Kasbek ..	614
ODS	b. Smolensk ..	798	OOL	b. Emanuel Nobel ..	613
ODT	b. Borodino ..	735	OOP	b. Princesse Clémén- tine OOP ..	614
ODV	b. Claro ..	747	OOQ	b. Keltier ..	614
ODW	b. Dago ..	749	OOS	b. Serbier ..	614
ODX	b. Gourko ..	760	OOT	b. Tongrier ..	615
ODZ	b. Stockport ..	799	OOU	b. Ubier ..	615
OEB	b. Cundall ..	749	OOV	b. Anvers ..	613
OEC	b. Grantley ..	760	OOZ	b. Tunisier ..	615
OED	b. Pensacola ..	787	OPA	b. Stad Antwerpen ..	615
OEE	b. Venice ..	807	OPC	b. Princesse Clémén- tine OPC ..	614
OEF	b. Trevider ..	805	OPE	b. Princesse Elisabeth ..	614
OEG	b. Fernandina ..	755	OPG	b. Republica Argentina ..	614
OEH	b. Norton ..	783	OPH	b. Princesse Henriette ..	614
OEI	b. Pomaron ..	788	OPK	b. Pieter De Coninck ..	614
OEJ	b. Wingate ..	812	OPL	b. Ville de Liège ..	615
OEK	b. Belgravian ..	733	OPM	b. Menapier ..	614
OEL	b. Bosnian ..	735	OPN	b. Nervier ..	614
OER	b. Grelisle ..	761	OPP	b. Peruvier ..	614
OES	b. Hermit ..	763	OPR	b. Le Rapide ..	614
OET	b. Brazilier ..	736	OPS	b. Persier ..	614
OEU	b. Gasconier ..	757	OPT	b. Trevier ..	615
OEZ	b. Burgondier ..	737	OPU	b. Austurienne ..	613
OFA	b. War African ..	808	OQB	c. Boma ..	528
OFB	b. Western ..	811	OQC	c. Coquilhatville ..	528
OFF	b. Taxandrier ..	802	QQD	c. Kindu ..	528
OFG	b. War Subadar ..	811	QQG	c. Kongolo ..	529
OFH	b. War Ghurka ..	809	QQH	c. Elisabethville ..	528
OFI	b. War Jemadar ..	809	QQI	c. Umangi ..	529
OFJ	b. War Shikari ..	810	QQK	c. Kikondja ..	528
OFK	b. War Rajah ..	810	QQL	c. Kinshasa ..	529
OFL	b. War Rane ..	810	QQM	c. Lusambo ..	529
OFM	b. War Rajput ..	810	QQO	c. Basoko ..	528
OFN	b. War Nizam ..	810	QQS	c. Stanleyville ..	529
OFO	b. Sunningdale ..	800	QQU	c. Basankusu ..	528
OFP	b. Edendale ..	752	ORA	b. Roi Albert ..	614
OFR	b. Flamma ..	756	ORC	b. Gallacier ..	613
OFS	b. Lucient ..	773	ORD	b. Director Gerling ..	613
OFT	b. Airedale ..	726	ORE	b. Memling ..	614
OFU	b. Northern Coast ..	783	ORG	b. Gothland ..	613
OFV	b. Loos ..	772	ORH	b. Hastier ..	613
OFX	b. Siptah ..	798	ORK	b. Kremlin ..	614
OGA	b. Yokohama ..	628	ORL	b. Lapland ..	614
OHB	c. Deutsch-Altenburg ..	527	ORP	b. Pionier ..	614
OHL	c. Laaerberg ..	527	ORR	b. Roumanier ..	614
ONA	c. Banana ..	528	ORS	b. Samland ..	614
ONC	b. Caledonier ..	613	ORU	b. Oural ..	614
ONE	b. L'Avenir ..	613	ORV	b. Bolivier ..	613
ONG	b. Gallier ..	613	ORZ	b. Northland ..	614
ONI	b. Indier ..	613	OSA	c. Anvers ..	529
ONJ	b. Jan Breydel ..	614	OSB	b. Sierra Blanca ..	614
ONL	b. General Leman ..	613	OSD	b. Sierra de Madre ..	615
ONM	b. Armistice ..	613	OSF	b. Sierra de Fuentes ..	614
ONN	b. Nipponier ..	614	OSG	b. Sierra Grande ..	615
ONO	b. Londonier ..	614	OSJ	b. Sierra Roja ..	615
ONP	b. Patagonier ..	614	OSM	c. Constantinople ..	585
ONQ	b. Algerier ..	613	OSM	b. Sierra Morena ..	615
ONR	b. Rogier ..	614	OSN	b. Sierra Negra ..	615
ONS	b. Sicilier ..	614			
ONU	b. Australier ONU ..	613			

		PAGE			PAGE
OSO	b. Sierra Leone ..	615	OWP	b. Minekran VI ..	626
OSQ	b. Sierra Quemada ..	615	OWQ	b. Narhvalen ..	627
OSR	b. Grand Remorqueur ..	613	OWR	b. Nordkaperen ..	627
OST	c. Ostende ..	529	OWS	b. Rota OWS ..	627
OTA	b. Ville d'Anvers ..	615	OWT	b. Havkatten ..	626
OTE	b. Erivan ..	613	OWT	b. Saltholm ..	627
OTI	b. Tunisie ..	615	OWU	b. Springeren ..	627
OTR	b. General Degoutte ..	613	OWV	b. Støren ..	627
OTV	b. Albertville ..	613	OWW	b. Söhunden ..	627
OTZ	b. Sierra Belgrano ..	614	OWX	b. Sölöven ..	627
OUA	b. Absalon ..	625	OWY	b. Saelen ..	627
OUD	b. Dannebrog ..	625	OWY	b. Thor OWY ..	628
OUF	b. Olfert Fischer ..	627	OXA	c. Copenhagen Radio ..	543
OUG	b. Gejser ..	626	AXB	c. Blaavand Radio ..	543
OUH	b. Herluf Trolle ..	626	OXC	c. Gjedser Havn ..	543
OUI	b. Islands Falk ..	626	OXD	c. Gjedser Havn ..	543
OUI	c. Eilvise ..	553	OXG	b. Prins Christian ..	627
OUI	b. Hejmdal ..	626	OXH	b. Prinsesse Alexan- drine ..	627
OUL	b. Lossen ..	626			
OUM	b. Beskytteren ..	625	OXJ	c. Thorshavn ..	547
OUN	b. Lövenörn ..	626	OKK	c. Tvaeraa ..	547
OOU	b. C. F. Grove ..	625	OXO	b. Afrika ..	625
OUP	b. Peder Skram ..	627	OXQ	b. Dana ..	625
OUQ	b. Hjaelperen ..	626	OXS	b. Smut ..	627
OUR	c. Anholt-Knob ..	543	OXT	b. Nordamerika ..	627
OUS	b. Skjold ..	627	OXU	b. Botnia ..	625
OUU	c. Gjedser Rev ..	543	OXV	b. Stillehavet ..	627
OUV	b. Valkyrien OUV ..	628	OXW	b. Mitau ..	626
OUW	c. Drogden ..	543	XXX	b. Alssund ..	625
OUX	c. Graadyb ..	544	XXY	b. Valkyrien ..	628
OUY	c. Vyl ..	544	XXZ	b. Nordhvalen ..	627
OUZ	c. Horns Rev ..	544	OYA	b. Copenhagen OYA ..	625
OVA	b. Anden April ..	625	OYB	b. Nordkap ..	627
OVB	b. Havfruen ..	626	OYF	b. Reval OYF ..	627
OVC	b. Nymfen ..	627	OYG	b. Libau ..	626
OVD	b. Delfinen ..	625	OYH	b. Ficaria ..	625
OVE	b. Havmanden ..	626	OYI	b. Primula OYI ..	627
OVF	b. Flyvefisken ..	626	OYJ	b. Protector OYJ ..	627
OVG	b. Galathea ..	626	OYK	b. Rota OYK ..	627
OVH	b. Hvalrossen ..	626	OYL	b. I. C. La Cour ..	626
OVI	b. Thetis OVI ..	628	OYM	b. Nordhavet ..	627
OVI	b. Söbjörnen ..	627	OYN	b. A. P. Bernstorff ..	625
OVK	b. Aegir ..	625	OYO	b. Russ ..	627
OVL	b. Ran ..	627	OYP	b. S. Croix ..	627
OVN	b. Najaden ..	626	OYQ	b. S. Thomas ..	627
OVO	b. Ormen ..	627	OYR	b. Asia ..	625
OVP	b. Triton OVP ..	628	OYS	b. Ribe ..	627
OVQ	b. Neptun ..	627	OYT	b. Fredericia ..	626
OVR	b. Söridderen ..	627	OYW	b. Bryderen ..	625
OVS	b. Spøkhuggeren ..	627	OYX	b. Rask ..	627
OVT	b. Tumleren ..	628	OYY	b. Eleonora Moersk ..	625
OVU	b. Søulven ..	627	OYZ	b. Ingolf ..	626
OVV	b. Vindhunden ..	628	OZA	b. Peru OZA ..	627
OVW	b. Sværdfisken ..	627	OZB	b. Hellig Olav ..	626
OWA	b. Bellona OWA ..	625	OZC	b. Oscar II. OZC ..	627
OWB	b. Diana OWB ..	625	OZD	b. United States OZD ..	628
OWC	b. Falster ..	625	OZE	b. Astrid ..	625
OWD	b. Fenris ..	625	OZF	b. Selandia ..	627
OWE	b. Flora ..	626	OZG	b. Jutlandia ..	626
OWF	b. Grönsund ..	626	OZH	b. Viking OZH ..	628
OWG	b. Guldborgsund ..	626	OZI	b. Pacific OZI ..	627
OWH	b. Hajen ..	626	OZJ	b. Store Nordiske ..	627
OWI	b. Havhesten ..	626	OZK	b. Fionia ..	625
OWJ	b. Havornen ..	626	OZL	b. Frederik VIII ..	626
OWK	b. Island ..	626	OZM	b. Siam ..	627
OWL	b. T. 7 ..	627	OZN	b. Annam ..	625
OWM	b. Makrelen ..	626	OZO	b. Phoenix OZO ..	627
OWN	b. T. 8 ..	628	OZP	b. Tongking ..	628
OWO	b. Minekran V ..	626	OZQ	b. Panama OZQ ..	627

		PAGE		PAGE	
OZR	b. Australien ..	625	PDG	b. Batavier VI ..	656
OZS	b. Arnold Moersk ..	625	PDH	b. Batavier III ..	656
OZU	b. Gullfoss ..	626	PDI	b. Batavier IV ..	656
OZV	b. Chile OZV ..	625	PDJ	b. Batavier V ..	656
OZW	b. Falstria ..	625	PDK	b. Mont Blanc ..	661
OZX	b. H. C. Orsted ..	626	PDL	b. Noorderdyk ..	661
OZY	b. Georg Stage ..	626	PDN	b. Rijnland ..	663
OZZ	b. Nordlys ..	627	PDO	b. Batavier II ..	656
PAA	b. De Zeven Provinciën ..	657	PDQ	b. Maartensdijk ..	660
PAB	b. Maarten Harpertz. Tromp ..	660	PDR	b. Drechterland ..	658
PAC	b. De Ruijter ..	657	PDS	b. Ocean PDS ..	661
PAD	b. Hertog Hendrik ..	659	PDT	b. American ..	656
PAE	b. Koningin Regentes ..	660	PDU	b. Gooiland ..	658
PAF	b. Zeeland PAF ..	666	PDV	b. J. B. Aug. Kessler ..	659
PAG	b. Poolzee ..	662	PDW	b. Selene ..	663
PAG	b. Torpedoboot ..	665	PDX	b. Hermes PDX ..	659
PAH	b. Holland ..	659	PDY	b. Delftland ..	657
PAJ	b. Noordbrabant ..	661	PDZ	b. Artemis PDZ ..	656
PAK	b. Gelderland ..	658	PEA	b. Rotterdam PEA ..	663
PAL	b. Jacob van Heems-kerck ..	659	PEB	b. Nieuw Amsterdam ..	661
PAM	b. Kortenaer ..	660	PEC	b. Noordam ..	661
PAN	b. Evertsen ..	658	PED	b. Rijnland ..	663
PAO	b. Piet Hein ..	662	PEE	b. Amsteldyk ..	656
PAQ	b. Hydra PAQ ..	659	PEF	b. Frisia ..	658
PAR	b. Medusa ..	661	PEG	b. Gelria ..	658
PAS	b. Vulcanus ..	665	PEH	b. Hollandia ..	659
PAT	b. Triton ..	665	PEI	b. Zeelandia ..	666
PAU	b. Gruno ..	658	PEJ	b. Stuyvesant ..	664
PAV	b. Brinio ..	657	PEK	b. Prins Frederik Hendrik ..	663
PAW	b. Friso ..	658	PEL	b. Commewijne ..	657
PAX	b. Mignenveger ..	661	PEM	b. Oranje Nassau PEM ..	662
PAY	b. Cornelis Drebhel ..	657	PEN	b. Prins der Neder-landen PEN ..	662
PBA	b. Zeehond ..	666	PEO	b. Prins Willem I ..	663
PAB	b. Ophir PBA ..	662	PEP	b. Anton V. Driel ..	656
PBB	b. Rindjani ..	663	PEQ	b. Van Rensselaer ..	665
PBC	b. Pangrango ..	662	PER	b. Nickerie ..	661
PBD	b. Wajang ..	665	PES	b. Tantalus ..	664
PBE	b. Tangka ..	664	PET	b. Sarpedon ..	663
PBF	b. Smeroe ..	664	PEU	b. Patroclus ..	662
PBG	b. Vorwaarts ..	665	PEV	b. Dardanus ..	657
PBO	b. Onderzeeboot ..	662	PEW	b. Sommelsdijk ..	664
PBQ	b. Hulpvaartuigen ..	659	PEX	b. No. 103 ..	661
PBS	b. Panther ..	662	PEY	b. No. 102 ..	661
PBT	b. Hermelijn ..	659	PEZ	b. Palembang ..	662
PBU	b. Jakhals ..	659	PFA	b. Goentoer ..	664
PBV	b. Vos ..	665	PFC	b. Tambora ..	660
PBW	b. Wolf ..	666	PFD	b. Kawi ..	663
PBX	b. Lynx ..	660	PFE	b. Sindoro ..	664
PBY	b. Fret ..	658	PFF	b. Tabanan ..	666
PBZ	b. Bulhond ..	657	PFG	b. Wilis ..	663
PCA	c. Amsterdam ..	567	PFH	b. Rindjani ..	658
PCB	c. Helder ..	568	PFI	b. Grotius ..	659
PCD	c. Flushing ..	568	PHJ	b. Johan de Witt ..	663
PCE	c. De Mok ..	568	PHK	b. Rembrandt ..	659
PCH	c. Scheveningen-Port ..	568	PHL	b. Jan Pieterszoon Coen ..	665
PCM	c. Terschellingerbank ..	568	PHM	b. Vondel ..	663
PCN	c. Noord-Hinder ..	568	PHN	b. Prinses Juliana PFN ..	657
PCO	c. Haaks bateau-phare ..	568	PFO	b. Bondowoso ..	662
PCP	c. Doggersbank Noord ..	568	PFP	b. Oranje ..	662
PCR	c. Doggersbank Zuid ..	568	PFQ	b. Prins der Neder-landen PFQ ..	662
PDA	b. Zeeland PDA ..	666	PFR	b. Birma ..	657
PDC	b. Prins Hendrik ..	663	PFS	b. Insulinde ..	659
PDE	b. Orange Nassau PDE ..	662	PFT	b. Patria ..	662
			PFU	b. Djocja ..	657
			PFV	b. Koningin der Neder-landen ..	660

		PAGE
PFW	b. Bandoeng ..	656
PFX	b. Jacatra ..	659
PFY	b. Kediri ..	660
PFZ	b. Walcheran ..	666
PGA	b. Medan ..	660
PGB	b. Menado ..	661
PGC	b. Gorontalo ..	668
PGD	b. Djebres ..	657
PGE	b. Merauke ..	661
PGF	b. Ternate ..	665
PGG	b. Deli ..	657
PGH	b. Samarinda ..	663
PGI	b. Madioen ..	661
PGJ	b. Soerakarta ..	664
PGK	b. Java ..	659
PGL	b. Krakatau ..	660
PGM	b. Sumatra PGM ..	664
PGN	b. Lombok ..	660
PGO	b. Celebes ..	657
PGP	b. Kangean ..	659
PGQ	b. Karimata ..	661
PGR	b. Nias ..	659
PGS	b. Kambangan ..	659
PGT	b. Billiton ..	656
PGU	b. Boeton ..	657
PGV	b. Batjan ..	656
PGW	b. Karimoen ..	660
PGY	b. Waaldijk ..	665
PGZ	b. Westerdijk PGZ ..	666
PHA	b. Radja ..	663
PHB	b. Riouw ..	663
PHC	b. Rotti ..	663
PHD	b. Arakan ..	656
PHE	b. Ceylon PHE ..	657
PHF	b. Djember ..	657
PHG	b. Noordwijk ..	661
PHH	b. Rotterdam PHH ..	663
PHI	b. Banka ..	656
PHJ	b. Bawean ..	656
PHK	b. Boeroe ..	657
PHL	b. Roepat ..	663
PHM	b. Rondo ..	663
PHN	b. New York ..	661
PHO	b. Soestdijk ..	666
PHP	b. Zuiderdijk ..	666
PHQ	b. Iris PHQ ..	659
PHR	b. Turbinia PHR ..	665
PHS	b. Veenbergen ..	665
PHT	b. Sitoebondo ..	664
PHU	b. Buitenzorg ..	657
PHV	b. Bintang ..	657
PHW	b. Willem van Driel Sr. ..	666
PHX	b. Thames ..	665
PHY	b. Warszawa ..	666
PHZ	b. Boorne ..	657
PIA	b. Bengkalis ..	656
PIB	b. Roode Zee ..	663
PIC	b. Humber ..	659
PID	b. Witte Zee ..	666
PIE	b. Zwarte Zee PID ..	666
PIF	b. Stad Zaandam ..	664
PIG	b. Stad Valkenburg ..	664
PIH	b. Friesland ..	658
PII	b. Stad Arnhem ..	664
PIJ	b. Zaandijk ..	666
PIK	b. Bali ..	656
PIL	b. Gorredijk ..	658
PIM	b. Djambi ..	657

PAGE			PAGE
656	PIN	b. Garoet	658
659	PIO	b. Tosari	665
660	PIP	b. Yseldijk	666
666	PIQ	b. Schiedijk	663
660	PIR	b. Veendijk	665
661	PIS	b. Winterswijk	666
668	PIT	b. Rijswyk	663
657	PIU	b. Randwijk	663
661	PIV	b. Brunswijk	657
665	PIW	b. Eibergen	658
657	RIX	b. Ameland	656
663	PIY	b. Celaeno	657
661	PIZ	b. Kelbergen	660
664	PJA	c. Aruba	643
659	PJB	c. Bonaire, Ile	543
660	PJC	c. Curaçao	543
664	PKA	c. Sabang Radio	545
660	PKB	c. Weltevreden Radio	545
657	PKC	c. Sitoebondo Radio	545
659	PKD	c. Koepang Radio	545
659	PKE	c. Amboina Radio	544
661	PKF	c. Balikpapan Radio	544
659	PKG	c. Tarakan	545
656	PKH	c. Soerabaya	545
657	PKS	b. Van Heenskerk	629
656	PKW	b. Juno	628
660	PLA	b. Telegraaf	629
665	PLB	b. Zeeslang	629
666	PLC	b. Koetei	628
663	PLD	b. Tydeman	629
663	PLE	b. Van Doorn	629
663	PLF	b. Sumbawa	629
656	PLG	b. Hercules PLG	628
657	PLH	b. Tjikembang	629
657	PLI	b. Tjisondari	629
661	PLJ	b. Tjimanoeck	629
663	PLK	b. Tjitroem	629
656	PLL	b. Tjibodas	629
656	PLM	b. Tjikini	629
657	PLN	b. Tjiliwong	629
663	PLO	b. Tjipanas	629
663	PLP	b. Tjilatjap	629
661	PLQ	b. Tjileboet	665
664	PLR	b. Tjisalak	629
666	PLU	b. India PLU	628
659	PLV	b. Lara	628
665	PLY	b. Mataram PLY	628
665	PLZ	b. Siboga	629
664	PMA	b. Ombillon	628
657	PMB	b. Siberg	629
657	PMB	b. Van Waerwijk	665
666	PMB	b. Siberg	629
665	PMC	b. Houtman	628
666	PMD	b. Melchior Treub	628
657	PME	b. Van Overstraeten	629
656	PMF	b. De Greve	628
663	PMG	b. S. Jacob	659
659	PMH	b. Roggeveen	628
666	PMI	b. Barentsz	628
666	PMJ	b. Van Cloon	629
664	PMK	b. Rumphius	628
664	PMM	b. Van Spilbergen	629
664	PMN	b. Van der Hagen	629
658	PMO	b. De Greve	658
664	PMP	b. Van Hoorn	665
666	PMQ	b. Lemaire	628
656	PMS	b. Sloet van de Belle	629
658	PMT	b. Van Linschoten	629
657	PMU	b. Van Imhoff	629

		PAGE			PAGE
PMV	b. Van Rees	629	PVM	b. Natal PVM	618
POZ	c. Nauen	553	PVN	b. Brazil PVN	616
PPA	b. Tapajoz	619	PVY	b. Itaquatia	617
PPB	b. Aracaty	615	PWA	c. Morro, Havana	542
PPC	c. Helevoetsluis	568	PWC	c. Santa Clara	542
PPC	b. Araguay	615	PWD	c. Chaparra	542
PPD	b. Assua	615	PWE	c. Baracoa	542
PPE	b. Capivary	616	PWF	c. Nueva Gerona	542
PPF	b. Corcovado PPF	616	PWG	c. La Fé	542
PPG	b. Gurupy	616	PXA	b. Arundo	656
PPK	b. Jaguaribi	617	PXB	b. Themisto	665
PPL	b. Jacuhy	617	PXC	b. Hago	659
PPN	b. Mossoro	618	PXD	b. Barendrecht	656
PPO	b. Mucury	618	PXE	b. Mydrecht	661
PPS	b. Taquary	619	PXF	b. Kieldrecht	660
PPU	b. Tibagy	619	PXG	b. California	657
PPV	b. Itapacy	617	PXH	b. India	659
PPX	b. Itaperuna	617	PXI	b. Mirach	661
PPY	b. Itaipava	617	PXJ	b. Sirrah	664
PPZ	b. Itaituba	617	PXK	b. Algenib	655
PQC	c. Corvo	527	PXL	b. Alphard	653
PQF	c. Flores	527	PXM	b. Yildum	666
PQH	c. Faial	527	PXN	b. Alkaid	655
PQK	c. S. Maria	527	PXO	b. Maashaven	661
PQL	c. Lisbon (Cintra)	576	PXP	b. Thuban	665
PQM	c. S. Miguel	527	PXQ	b. Bellatrix	656
PQP	c. Porto (Leixões)	576	PXR	b. Procyon	663
PQT	c. Terceira	527	PXS	b. Dubhe	658
PTB	b. Massasot	667	PXT	b. Zwarte Zee PXT	666
PTC	c. Fortaleza de Santa Cruz	531	PXU	b. Oostzee	662
PTI	c. Fortaleza de Imbuhy	531	PXV	b. Ootmarsum	662
PTJ	c. Fortaleza de S. João	531	PXW	b. Delft	657
PTL	c. Fortaleza de Lage	531	PXX	b. Jan V. Nassau	659
PTN	c. Nictheroy	532	PXZ	b. Juno PXZ	659
PTQ	c. Quartel General	532	PYA	b. Johanna	659
PTV	c. Villa Militar	532	PYB	b. Jason	659
PUA	b. Anna PUA	615	PYC	b. Orestes	662
PUB	b. Tabatinga	619	PYD	b. Slidrecht	664
PUC	b. Santarem	619	PYE	b. Wieldrecht	666
PUD	b. Barbacena	615	PYF	b. Ubbergen	665
PUE	b. Guaratuba	616	PYG	b. Almelo	655
PUF	b. Curityba	616	PYH	b. Alkmaar	655
PUH	b. Joazciro	617	PYI	b. Gonymedes	658
PUI	b. Lages	617	PYJ	b. Eemland	658
PUJ	b. Macapa	618	PYK	b. Gaasterland	658
PUK	b. Cabedello	616	PYL	b. Kennemerland	660
PUL	b. Palmares	618	PYM	b. Maasland	661
PUM	b. Maranguape	618	PYN	b. Lingestroom	660
PUN	b. Ilhéos	616	PYO	b. Moerdyk	661
PUO	b. Cannavieiras	616	PYP	b. Ellewoutsdyk	658
PUP	b. Jequitinhonha	617	PYQ	b. Batoe	656
PUQ	b. Commandatubua	616	PYR	b. Ambon	655
PUR	b. Marahú	618	PYS	b. Ceram	657
PUS	b. Porto Seguro	618	PYT	b. Calcutta PYT	657
PUT	b. Guararapes	616	PYU	b. Crynsen	657
PUU	b. Philadelphia PUU	618	PYV	b. Ulysses	665
PUV	b. Brazileira	616	PYW	b. Ceres	657
PUY	b. Ada PUY	615	PYX	b. Norddyk	661
PUZ	b. Zilka	619	PYY	b. Kinderdyk	660
PVA	b. Belem	615	PYZ	b. Rijndijk	663
PVB	b. Campeiro	616	PZA	b. Bussen	657
PVD	b. Campinas	616	PZB	b. Leersum	660
PVE	b. Neuquen	618	PZD	b. Hilversum	659
PVH	b. Guanabara	616	PZE	b. Oostdyk	662
PVI	b. Marne PVI	618	PZF	b. Trompenberg	665
PVJ	b. Piave	618	PZG	b. Marken	661
PVK	b. Rio Amazonas	618	PZH	b. Zuid-Holland	666
PVL	b. Antonina	615	PZI	b. Rijsbergen	663
			PZJ	b. Salland	663

PAGE			PAGE
661	RHP	b. Vsadnik	711
656	RHQ	b. Gaïdamak	706
656	RHR	b. Oussouriets	708
666	RHS	b. Tourkmen Stavro-	
666		polskii	709
664	RHT	b. Oukraina	708
664	RHU	b. Kazanets	707
664	RHV	b. Strachnyi	709
663	RHW	b. Donskoi Kazak	705
666	RHX	b. Zabaikalets	711
656	RHZ	b. Steregouchtii	709
666	RIA	b. Voiskovoi	710
662	RIB	b. Angara	705
660	RIC	b. Oka	707
658	RID	b. Kama	706
657	RIE	b. Pechora	708
542	RIG	b. Soukhona	709
578	RIJ	b. Mezen	707
579	RIK	b. Riga	708
578	RJS	b. Anadyr	705
579	RKA	b. Evstafii	706
577	RKC	b. Ioann Zlatoust	706
547	RKD	b. Panteleimon	708
546	RKE	b. Tri Sviatitelia	709
564	RKF	b. Rostislav	708
705	RKG	b. Sinop	709
578	RKI	b. Gheorgii Pobedono-	
578		setz	706
577	RKL	b. Pamiat Merkouria ..	708
577	RKM	b. Kagoul	706
579	RKO	b. Donetz	705
709	RKP	b. Ouraletz	708
708	RKS	b. Koubanetz	707
707	RKT	b. Teretz	709
709	RKU	b. Almaz	705
705	RKV	b. Prout	708
708	RKW	b. Dounaïi	705
705	RKX	b. Kronstadt	707
706	RKZ	b. Berezan	705
709	RLB	b. Leitenant Chestakoff	707
709	RLC	b. Kapitan Saken	707
706	RLD	b. Leitenant Zatsa-	
705		rennyi	707
705	RLE	b. Kapitan Leitenant	
708		Baranoff	707
705	RMA	b. Askold	705
707	RMB	b. Zemtchoug	711
705	RMD	b. Oussourri	708
705	RME	b. Mangougai	707
705	RMF	b. Mandjour	707
707	RMH	b. Taimir	709
708	RML	b. Vaiguatch	710
707	RNB	b. Toula	709
707	RNC	b. Kishinev	707
707	RND	b. Vologda RND	710
705	RNE	b. Nijni-Novgorod	707
709	RNF	c. Fort d'Alexandrovsk	577
706	RNG	b. Saratov	709
707	RNH	b. Ekaterinoslav RNH	705
708	RNI	b. Vélikaïa Kniaïjna	
		Maria Nikolaïevna	710
706	RNJ	b. Cherson	705
706	RNK	b. Kiev	707
707	RNL	c. Nicolaïewsk RNL ..	578
708	RNM	b. Mohilev	707
705	RNN	c. Naïakhan	578
706	RNO	b. Iaroslavl	706
707	RNP	b. Novgarod RNP	707
705	RNQ	b. Erivan KNQ	705

1000 Year-Book of Wireless Telegraphy and Telephony

		PAGE		PAGE	
RNR	<i>c. Anadyr</i>	577	RSA	<i>b. Mitau</i>	707
RNS	<i>b. Stavropol</i>	709	RSC	<i>b. Tsar</i>	709
RNT	<i>b. Tver</i>	710	RSK	<i>b. Koursk RSK</i>	707
RNV	<i>b. Vladimir</i>	710	RSP	<i>b. Semferopol</i>	700
RNW	<i>b. Tambov</i>	709	RSR	<i>b. Rossiya RSR</i>	708
RNX	<i>b. Voronëje</i>	710	RST	<i>b. Poltava</i>	708
RNY	<i>b. Koursk RNY</i>	707	RSZ	<i>b. Penza</i>	708
RNZ	<i>b. Admiral Zavoïko</i>	705	RTM	<i>c. Mare-Sale</i>	577
ROB	<i>b. Sichan</i>	708	RTU	<i>c. Yougorski-Char</i>	579
ROC	<i>b. Simbirsk</i>	708	RTV	<i>c. Vaigatch</i>	579
ROD	<i>b. Vélikaia Kniaguinia</i> <i>Xénia Alexan-</i> <i>drovna</i>	710	SF	<i>c. Hanover</i>	553
ROE	<i>c. Rade de Taganrog</i>	578	SG	<i>c. Stuttgart</i>	554
ROF	<i>b. Toms</i>	709	SK	<i>c. Staaken</i>	554
ROG	<i>b. Kolyma</i>	707	SN	<i>c. Santiago de Cuba</i>	542
ROH	<i>b. Turgai</i>	710	SN	<i>c. Stettin</i>	554
ROJ	<i>b. Irtysh</i>	706	SAA	<i>c. Karlskrona</i>	584
ROK	<i>c. Pétrowsk, Daghestan</i>	578	SAB	<i>c. Gothenburg</i>	584
ROL	<i>c. Libau ROL</i>	564	SAC	<i>c. Trälleborg</i>	584
ROM	<i>b. Omsk</i>	708	SAE	<i>c. Tingstäde</i>	584
RON	<i>b. Astrachan RON</i>	705	SAF	<i>c. Vaxholm</i>	585
ROP	<i>b. Kamenetz - Podolsk</i> <i>ROP</i>	706	SAG	<i>c. Olandsrev Light-</i> <i>ship</i>	584
ROQ	<i>b. Tobolsk</i>	709	SAH	<i>c. Harnösand</i>	584
ROR	<i>c. Reval</i>	578	SAI	<i>c. Boden</i>	584
ROS	<i>b. Soutchan</i>	709	SBA	<i>b. Svea</i>	724
ROT	<i>c. Okkhots</i>	578	SBB	<i>b. Göta</i>	721
ROU	<i>b. Krasnoïarsk ROU</i>	707	SBC	<i>b. Thule SBC</i>	724
ROV	<i>b. Tobol</i>	709	SBE	<i>b. Thor</i>	724
RPA	<i>b. Afon</i>	705	SBF	<i>b. Niord</i>	723
RPB	<i>b. Imperator Nicolai II</i>	706	SBG	<i>b. Dristigheten</i>	721
RPC	<i>b. Tchikachoff</i>	709	SBH	<i>b. Aran</i>	719
RPD	<i>b. Euphrate RPD</i>	705	SBI	<i>b. Wasa</i>	725
RPE	<i>b. Odessa RPE</i>	707	SBJ	<i>b. Tapperheten</i>	724
RPF	<i>b. TsessarevitchGueorgui</i>	710	SBK	<i>b. Manligheten</i>	722
RPG	<i>b. Vélikaia Kniaguinia</i> <i>Xenia</i>	710	SBL	<i>b. Oscar II SBL</i>	723
RPH	<i>b. Prinzessa Evguenia</i> <i>Oldenbourgskaja</i>	708	SBM	<i>b. Fylgia</i>	721
RPI	<i>b. Jerousalim</i>	706	SBN	<i>b. John Ericsson</i>	721
RPK	<i>c. Pétrapavlovsk</i>	578	SBO	<i>b. Örnén</i>	723
RPL	<i>b. Koroleva Olga II</i>	707	SBP	<i>b. Jacob Bagge</i>	721
RPM	<i>b. Imperator Nicolai</i>	706	SBQ	<i>b. Claes Horn</i>	721
RPN	<i>c. Kerbinskaia</i>	577	SBS	<i>b. Psilander</i>	723
RPO	<i>b. Veliki Kniaz Con-</i> <i>stantine</i>	710	SBT	<i>b. Rota SBT</i>	723
RPP	<i>b. Imperator Piotre</i> <i>Veliki</i>	706	SBU	<i>b. Skuld</i>	724
RPO	<i>b. Veliki Kniaz Alexii</i>	710	SBV	<i>b. Edda</i>	721
RPR	<i>b. Piotre Veliki</i>	708	SBW	<i>b. Drott</i>	721
RPS	<i>b. Imperatriza Ekaterina</i> <i>II</i>	706	SBX	<i>b. Blenda</i>	720
RPT	<i>b. Tigre</i>	709	SBY	<i>b. Mode</i>	723
RPU	<i>b. Imperator Alexandre</i> <i>III</i>	706	SBZ	<i>b. Magne</i>	722
RPV	<i>b. Tzar Mikhaïl Theo-</i> <i>dorowitch</i>	709	SCA	<i>b. Wale</i>	725
RPW	<i>b. Veliki Kniaz Alex-</i> <i>andre</i>	710	SCB	<i>b. Ragnar</i>	723
RPX	<i>b. Sviatoi Nichol</i>	709	SCC	<i>b. Sigurd</i>	723
RPY	<i>b. Tsessarevitch Alexey</i> <i>Nikolaievitch</i>	710	SCD	<i>b. Vidar</i>	725
RPZ	<i>b. Polezny</i>	708	SCE	<i>b. Hugin</i>	721
RQA	<i>c. Arkhangel</i>	577	SCF	<i>b. Munin</i>	723
RQT	<i>c. Rade d'Astrakhan</i>	578	SCG	<i>b. Tirfing</i>	725
RRG	<i>c. Riga</i>	564	SCH	<i>b. Thordön</i>	724
RRN	<i>c. Rovno</i>	578	SCI	<i>b. Clas Flemming</i>	721
RRT	<i>c. Taganrog</i>	578	SCJ	<i>b. Skäggald</i>	724
			SCK	<i>b. Svenskund</i>	724
			SCL	<i>b. Sverige</i>	724
			SCM	<i>b. Wachtmeister</i>	725
			SCN	<i>b. Wrangel</i>	725
			SEA	<i>b. Konung Gustaf V</i>	722
			SEB	<i>b. Drottning Viktoria</i>	721
			SEC	<i>b. Skagerak</i>	724
			SED	<i>b. Malmo</i>	722
			SFB	<i>b. Saga SFB</i>	723
			SFC	<i>b. Thule SFC</i>	724
			SFD	<i>b. Texas SFD</i>	724

Call Letters allotted to Land and Ship Stations 1001

		PAGE			PAGE
SFE	<i>b. Indianic</i>	721	SIE	<i>b. Harald</i>	721
SFF	<i>b. Hellenic</i>	721	SIF	<i>b. Vinga</i>	725
SFG	<i>b. Tasmanic</i>	724	SIG	<i>b. Gullmarn</i>	721
SFH	<i>b. Australic</i>	719	SIH	<i>b. Gustavsholm</i>	721
SFJ	<i>b. Torn</i>	725	SIJ	<i>b. Odessa SII</i>	723
SFL	<i>b. Abisko</i>	719	SIL	<i>b. Varna</i>	725
SFO	<i>b. Vollrath Tham</i>	725	SIM	<i>b. Cavalla</i>	720
SFP	<i>b. Sir Ernest Cassel</i>	724	SIN	<i>b. Stureholm</i>	724
SFQ	<i>b. Kratos</i>	722	SIO	<i>b. Hermes SIM</i>	721
SFS	<i>b. Africanic</i>	719	SIP	<i>b. Egil</i>	721
SFT	<i>b. Atlantic</i>	719	SIQ	<i>b. Nippon SIO</i>	723
SFU	<i>b. Baltic SFU</i>	720	SIR	<i>b. Carmen SIP</i>	720
SFV	<i>b. Kronprins Gustaf Adolf</i>	722	SIS	<i>b. Holmia</i>	721
SFW	<i>b. Boden</i>	720	SIT	<i>b. Salen</i>	723
SFX	<i>b. Narvik</i>	723	SIU	<i>b. Svarten</i>	724
SFY	<i>b. Kronprinsessan-Margareta</i>	722	SIW	<i>b. Mertinem</i>	723
SFZ	<i>b. Pacific SFZ</i>	723	SIX	<i>b. Buenos Aires SIU</i>	720
SGB	<i>b. Kronprinsessan-Victoria</i>	722	SIY	<i>b. Italia SIV</i>	721
SGC	<i>b. San Francisco SGC</i>	723	SIZ	<i>b. Bernicia</i>	720
SGD	<i>b. Sumatra SGD</i>	724	SJA	<i>b. Lombardia SIX</i>	722
SGE	<i>b. Pedro Christophersen</i>	723	SJC	<i>b. Ragne</i>	723
SGF	<i>b. Sydic</i>	724	SNA	<i>b. Sonja</i>	724
SGG	<i>b. Nordic</i>	723	SNB	<i>b. Alstern</i>	719
SGH	<i>b. Heimdall</i>	721	SNC	<i>b. Mjörn</i>	723
SGI	<i>b. Siljan</i>	723	SND	<i>b. Alagôas</i>	615
SGK	<i>b. Axel Johnson</i>	720	SNE	<i>b. Bahia SNB</i>	615
SGL	<i>b. Stockholm</i>	724	SNF	<i>b. Ceara SNC</i>	616
SGM	<i>b. Sagoland</i>	723	SNH	<i>b. Deodoro</i>	616
SGN	<i>b. Oaxen V</i>	723	SNI	<i>b. Pará SNE</i>	618
SGO	<i>b. Balder</i>	720	SNJ	<i>b. Floriano</i>	616
SGP	<i>b. Bele</i>	720	SNK	<i>b. Paraná SNH</i>	618
SGQ	<i>b. Thorsten</i>	724	SNL	<i>c. Ilha das Cobras</i>	531
SGR	<i>b. Carlsholm</i>	720	SNM	<i>b. Jose Bonifacio</i>	617
SGT	<i>b. Succia</i>	724	SNN	<i>b. Santa Catharina</i>	619
SGU	<i>b. Skagern</i>	724	SNO	<i>b. Laurindo Pitta</i>	618
SGV	<i>b. G. D. Kennedy</i>	721	SNP	<i>b. Minas Geraes SNM</i>	618
SGW	<i>b. Valparaiso</i>	725	SNQ	<i>c. Abrolhos</i>	530
SGX	<i>b. Japan</i>	721	SNR	<i>b. Sergipe SNO</i>	619
SGY	<i>b. Ceylon SGY</i>	721	SNS	<i>b. Sao Paulo SNP</i>	619
SHA	<i>b. Bolmen</i>	720	SNU	<i>c. Ilha do Boqueirão</i>	531
SHB	<i>b. Prinsessan-Ingeborg</i>	723	SNV	<i>c. Natal Norte</i>	532
SHC	<i>b. Aeolus</i>	719	SNW	<i>b. Rio Grande do Norte</i>	619
SHD	<i>b. Birger Jarl</i>	720	SNZ	<i>c. Ladario</i>	532
SHF	<i>b. Yeddo</i>	725	SOA	<i>c. Villegaignon</i>	532
SHG	<i>b. Aspen</i>	719	SOB	<i>c. Armção</i>	530
SHH	<i>b. Annie Johnson</i>	719	SOC	<i>c. Ilha Raza</i>	531
SHJ	<i>b. Lima SHJ</i>	722	SOD	<i>b. Amazonas</i>	615
SHK	<i>b. Drottning Sophia</i>	721	SOE	<i>b. Barroso</i>	615
SHL	<i>b. Kronprins Gustaf</i>	722	SOG	<i>b. Benjamin Constant</i>	615
SHM	<i>b. Oscar Fredrik</i>	723	SOH	<i>c. Anhatonirim</i>	530
SHN	<i>b. Bullaren</i>	720	SOI	<i>b. Carlos Gomes</i>	616
SHO	<i>b. Hansa</i>	721	SOJ	<i>b. Matto Grosso</i>	618
SHQ	<i>b. Tismaren</i>	725	SOK	<i>c. Ilha do Governador</i>	531
SHR	<i>b. Isbrytaren II</i>	721	SOL	<i>b. Jaguarão</i>	617
SHS	<i>b. Magda</i>	722	SOM	<i>b. Sargento Albuquerque</i>	619
SHT	<i>b. Bris</i>	720	SOP	<i>b. Belmonte</i>	615
SHU	<i>b. Faxen</i>	721	SOQ	<i>c. Sao Luiz</i>	532
SHV	<i>b. Peking</i>	723	SOR	<i>b. Parahyba</i>	618
SHW	<i>b. Patricia SHW</i>	723	SOT	<i>c. Ilha de Mocangue</i>	531
SHX	<i>b. Balboa</i>	720	SOU	<i>b. Rio Grande do Sul</i>	619
SHY	<i>b. Atland</i>	719	SOV	<i>b. Trádentens</i>	619
SHZ	<i>b. Turbinia SHZ</i>	725	SOW	<i>b. Republica SOU</i>	618
SIA	<i>b. Anglia SIA</i>	719	SOX	<i>c. Escola, Naval</i>	531
SIB	<i>b. Luguria SIB</i>	722	SOY	<i>b. Sousmarin F 1</i>	619
SIC	<i>b. Massilia</i>	723	SOZ	<i>b. Sousmarin F 3</i>	619
SID	<i>b. Catalonia</i>	720	SPA	<i>b. Piauhv</i>	618
				<i>b. Sousmarin F 5</i>	619
				<i>c. Amaralina</i>	530

		PAGE			PAGE			PAGE
SPB	c. Belém, Pará ..	530	STE	b. Itaquera ..	617	SWN	b. Nora Saliari ..	655
SPE	c. Escola Radio ..	531	STF	b. Itagiba ..	616	SWO	b. Ellin ..	654
SPJ	c. Junção ..	531	STG	b. Itajuba ..	617	SWP	b. Panaghis ..	655
SPN	c. Fernando de Noronha	531	STH	b. Itapema ..	617	SWQ	b. Othon Stathatos ..	655
SPO	c. Olinda, Pernambuco	532	STI	b. Itapuca ..	617	SWR	b. Ioannis Vatis ..	654
SPS	c. Mont' Serrat ..	532	STJ	b. Itauba ..	617	SWS	b. Granicos ..	654
SPT	c. Cabo de São Thomé	531	STK	b. Itabera ..	616	SWT	b. Iro ..	654
SPY	c. Babylonia ..	530	STL	b. Itamaraca ..	619	SWU	b. Eperoki ..	654
SQC	c. Cruzeiro do Sul ..	531	STM	b. Therézina ..	619	SWV	b. Zakynthos ..	655
SOL	c. Labrea, Brazil ..	532	STO	b. Taubate ..	619	SWW	b. Zanos Sifneo ..	655
SOM	c. Manaus ..	532	STP	b. Parnahyba ..	618	SWX	b. Adamantios Lemos	655
SQN	c. Senna Madureira ..	532	STQ	b. Benevente ..	615	SWY	b. Michael L. Embiricos	653
SQR	c. Rio Branco, Acre ..	532	STR	b. Campos ..	616	SWZ	b. Kate ..	654
SQS	c. Santarém, Pará ..	532	STS	b. Iguassú ..	616	SXA	c. Athens ..	555
SQT	c. Tarauacá ..	532	STT	b. Sabara ..	619	SXB	c. Athens, No. 2 ..	555
SQV	c. Porto Velho ..	532	STV	b. Pelotas ..	618	SXC	c. Salonique ..	555
SQX	c. Xapury ..	533	STW	b. Victoria STW	619	SXF	c. Fassa ..	555
SRA	b. Rio de Janeiro SRA	618	STX	b. Alegrete ..	615	SXK	c. Corfou ..	555
SRB	b. Minas Geraes SRB	618	STY	b. Aracaju ..	618	SXL	c. Salamis ..	555
SRC	b. Sao Paulo SRC ..	619	STZ	b. Mandú ..	620	SXS	c. Thassos ..	555
SRD	b. Ceará SRD ..	616	SUA	b. Mahroussa ..	620	SXT	c. Syra ..	555
SRE	b. Bahia SRE ..	615	SUB	c. Port Said ..	545	SYA	b. Velos ..	555
SRF	b. Acre ..	615	SUC	c. Abu Zabal ..	545	SYB	b. Averno ..	553
SRG	b. Satellite ..	619	SUD	c. Port Sudan ..	584	SYC	b. Lonchi ..	655
SRH	b. Sergipe SRH ..	619	SUF	b. Aida ..	620	SYD	b. Dora ..	654
SRI	b. Laguna ..	618	SUG	b. Abdel Moneim ..	545	SYE	b. Ierax ..	654
SRJ	b. Aymoré ..	615	SUH	c. Alexandria ..	583	SYF	b. Sfendoni ..	654
SRK	b. Maranhão ..	618	SUK	c. Khartoum ..	583	SYG	b. Nea Gennea ..	655
SRL	b. Olinda ..	618	SVA	b. Adriaticos ..	653	SYH	b. Hydra SYH ..	655
SRM	b. Brazil SRM ..	615	SVB	b. Chios ..	654	SYI	b. Aspis ..	654
SRO	b. Mercêdes SRO ..	618	SVC	b. Syria ..	655	SYJ	b. Kanaris ..	653
SRP	b. Oyapock ..	618	SVD	b. Peloponissos ..	654	SYK	b. Keravnos ..	654
SRQ	b. Pará SRQ ..	618	SVE	b. Erisos ..	655	SYL	b. Leon ..	654
SRR	b. Servulo Durado ..	619	SVF	b. Mykali ..	654	SYM	b. Amfitrite ..	654
SRS	b. Manaus ..	618	SVG	b. Ghoissa ..	654	SYN	b. Niki ..	653
SRT	b. Ruy Barboza ..	619	SVH	b. Hydra SVH ..	654	SYO	b. Aetos ..	655
SRU	b. Iris SRU ..	616	SVI	b. Nicolaos Athanassu-	655	SYV	b. Panthir ..	653
SRV	b. Prudente de Moraes	618		lis ..	655	SYW	b. Psara ..	655
SRW	b. Sirio ..	619	SVJ	b. Antigoni ..	653	SYX	b. Nafkratousa ..	655
SRX	b. Almirante Jaceguay	615	SVK	b. Kalypso Vergotti ..	654	SYZ	b. Spetsai ..	655
SRV	b. Javary ..	617	SVL	b. Elpis ..	653	SYT	b. Thyella ..	655
SRZ	b. Florianopolis ..	616	SVM	b. Athina ..	655	SYU	b. Alcyon ..	655
SSA	b. Wenceslau Braz ..	619	SVN	b. Ourana ..	655	SYV	b. Aigil ..	653
SSB	b. Commandante Bel-	616	SVO	b. Ermoupolis ..	655	SYW	b. Arethousa ..	653
	ham ..	616	SVP	b. Patris ..	655	SYX	b. Daphni ..	653
SSC	b. Goyaz ..	616	SVQ	b. Melpo ..	653	SYZ	b. Doris SYY ..	654
SSE	b. Purus ..	618	SVR	b. Archangelos ..	653	SZA	b. Thétis SYZ ..	654
SSF	b. Itú ..	617	SVS	b. Andreas ..	655	SZB	b. Helli ..	655
SSG	b. Ayruoca ..	615	SVT	b. Themistocles SVT	655	SZC	b. Limnos ..	654
SSH	b. Curvello ..	616	SVU	b. Rokos Vergottis ..	655	SZD	b. Kilis SZC ..	654
SSI	b. Jaboatao ..	617	SVV	b. Megali Hellas ..	654	SZE	b. Nikopolis ..	654
SSJ	b. Avaré ..	615	SVW	b. Istros ..	653	TFA	b. Promithes ..	655
SSK	b. Inga ..	616	SVX	b. Antonios ..	654	TFB	c. Reykjavik Radio ..	557
SSL	b. Atalaia ..	615	SVY	b. Irene ..	654	TFG	c. Flately & Breidafirdi	557
SSN	b. Cuyaba ..	616	SVZ	b. Dirphys ..	653	TGA	b. Gullfoss ..	557
SSP	b. Poconé ..	618	SWA	b. Aeon ..	655	TGB	b. Pelops ..	654
SSR	b. Sobral ..	619	SWB	b. Pantias Rallis ..	654	TGC	b. Pinos ..	655
SSS	b. Alfenas ..	615	SWC	b. Dionyssios Stathatos	654	TGD	b. Spetzai TGD ..	655
SST	b. Caxias ..	616	SWD	b. Efstathios ..	655	TGE	b. Elsie ..	655
SSU	b. Bagé ..	615	SWE	b. Youlia ..	655	TGF	b. Ismene ..	654
SSV	b. Leopoldina ..	618	SWF	b. Michael Bistis ..	653	TGG	b. Spyridon ..	654
SSW	b. Caxambu ..	616	SWG	b. Argolis ..	654	THZ	b. Panaghis Vergottis	655
SSX	b. Baependy ..	615	SWH	b. Elpidophorus ..	653	TIA	b. Alberto ..	655
SSY	b. Santos SSY ..	619	SWI	b. Aristidis Bistis ..	654	TIB	b. Alfonso Fierro ..	711
SSZ	b. Uberaba ..	619	SWJ	b. Iolkos ..	654	TIC	b. Arenas ..	711
STA	b. Itapura ..	617	SWK	b. Evangelos ..	654	TID	b. Armando TID ..	711
STB	b. Itatinga ..	617	SWL	b. Hilarios ..	654	TIE	b. Arno Mendi ..	711
STC	b. Itassucé ..	617	SWL	b. Livanos ..	654	TIF	c. Tifis ..	712
STD	b. Itapuhy ..	617	SWM	b. Maroudio Inglessi ..	655			552

PAGE			PAGE
655	TIF	b. Arraiz	712
654	TIG	b. Bachi	712
655	TIH	b. Banana	712
655	THI	b. Banderas	712
654	TIJ	b. Bara-bi	712
654	TIK	b. Baracaldo	712
654	TIL	b. Bermeo	712
654	TIM	b. Betis	712
655	TIN	b. Blas de Lezo	712
655	TIO	b. Cabo Creus	713
653	TIP	b. Castro Alen	713
655	TIQ	b. Cervera	713
654	TIR	b. Ciervana	713
555	TIS	b. Conde de Abasolo	713
555	TIT	b. Cosme y Jacinta	713
555	TIU	b. Cristina Rueda	713
555	TIV	b. Cristobal Llusa	713
555	TIW	b. Donato	713
555	TIX	b. Durango	713
555	TIY	b. Escolano	713
555	TIZ	b. Espana No. 1	714
653	TJA	b. Espana No. 2	714
655	TJB	b. Espana No. 3	714
654	TJC	b. Espana No. 4	714
654	TJD	b. Espana No. 5	714
654	TJE	b. Espana No. 6	714
655	TJF	b. Felix	714
655	TJG	b. Gloria	714
654	TJH	b. Goizeko Izarra	714
653	TJI	b. Guillermo	714
654	TJJ	b. Isabel de Llusa	715
654	TJK	b. Igualada	714
654	TJL	b. Iturri Urdina	715
653	TJM	b. J. C. Llusa	715
655	TJN	b. Joaquin Pujol	715
653	TJO	b. Lily	715
655	TJP	b. Luis A. Goni	715
655	TJQ	b. Luis Casanova	715
655	TJR	b. Madrid TJR	715
655	TJS	b. Manu	715
655	TJT	b. Mar Adriatico	715
653	TJU	b. Mar Blanco	715
653	TJV	b. Mar Caribe	715
653	TJW	b. Mar del Plata	716
654	TJX	b. Margari	716
654	TJY	b. Marie Elena	716
655	TJZ	b. Maliano	715
654	TJZ	b. Marianela	716
654	TKA	b. Mercurio	716
654	TKB	b. Orzarosa	717
655	TKC	b. Paz de Epalza	717
655	TKD	b. Pena Augustina	717
557	TKE	b. Pena Cabarga	717
557	TKF	b. Pena Rocias	717
667	TKG	b. Posta Querol	717
654	TKH	b. Previsor	717
655	TKI	b. Ramon de Bikuna	717
655	TKJ	b. Ramon Numbru	717
655	TKK	b. Ramonita	717
654	TKL	b. Romeu	717
654	TKM	b. Rontegui	717
655	TKN	b. Rosendo Masia	717
655	TKO	b. San Jose	717
711	TKP	b. Santa Ana	717
711	TKQ	b. Sebastian	717
711	TKR	b. Serafin Ballesteros	717
711	TKS	b. Tablada	718
712	TKT	b. Teresa	718
552	TKU	b. Torre del Oro	718

		PAGE			PAGE
TKV	b. Valentin ..	719	TXM	b. Vesta ..	665
TKW	b. Valmurian ..	719	TXN	b. Vulcanus ..	665
TKX	b. Viuda de Llusa ..	719	TXO	b. Baarn ..	656
TKY	b. Viva ..	719	TXP	b. Helder ..	659
TKZ	b. Villafranca ..	719	TXQ	b. Deucalion ..	657
TLA	b. Elanahove ..	713	TXR	b. Neurus ..	661
TLB	b. Olesa ..	716	TXS	b. Arnhem ..	656
TLD	b. Elcano ..	713	TXT	b. Poseidon ..	662
TSR	c. Petrograd (Tsarskoe-Selo) ..	578	TXU	b. Edam ..	658
TVA	b. Andyk ..	656	TXV	b. Gaasterdijk ..	658
TVB	b. Beukelsdyk ..	656	TXW	b. Groentdijk ..	658
TVC	b. Maasdyk ..	661	TXX	b. Beemsterdijk ..	656
TVD	b. Poeldyk ..	662	TXY	b. Breedijk ..	657
TVE	b. Sloterdijk ..	664	TXZ	b. Binnendijk ..	656
TVF	b. Zijldijk ..	666	TYA	b. Elisabeth ..	658
TVG	b. Vechtdijk ..	665	TYB	b. Magdalen ..	661
TVH	b. Kinderdijk ..	660	TYC	b. Cornelis ..	657
TVI	b. Moerdijk ..	661	TYD	b. Pheeda ..	662
TVJ	b. Eemdijk ..	658	TYF	b. Keilehaven ..	660
TVK	b. Stads-dijk ..	664	TYG	b. Wassenaar ..	666
TVL	b. Maasdam ..	661	TYI	b. Waalhaven ..	665
TVM	b. Leerdam ..	660	TYJ	b. Veerhaven ..	665
TVN	b. Spaarndam ..	664	TYK	b. Jobshaven ..	659
TVO	b. Amstelstroom ..	656	TYL	b. Parkhaven ..	662
TVP	b. Berkelstroom ..	656	TYM	b. Hillegom ..	659
TVQ	b. Drechtstroom ..	658	TYN	b. Naalwijk ..	661
TVR	b. Gouwestroom ..	658	TYO	b. Vreewijk ..	665
TVS	b. Hontestroom ..	659	TYP	b. Katwijk ..	660
TVT	b. Jaarstroom ..	659	TYQ	b. Britsum ..	657
TVU	b. Kilstroom ..	660	TYR	b. Boomberg ..	657
TVV	b. Texelstroom ..	665	TYZ	b. Malang ..	661
TVW	b. Waalstroom ..	665	TZA	b. Tob ..	665
TVX	b. Zaanstroom ..	666	TZB	b. Mont Cennis ..	661
TVY	b. Merwestroom ..	661	TZC	b. Maristo ..	661
TWA	b. Saleier ..	663	TZD	b. Noordzee ..	666
TWB	b. Salabangka ..	663	TZE	b. Yselveer ..	656
TWC	b. Salawati ..	663	TZF	b. Beursplein ..	666
TWD	b. Simaloor ..	663	TZG	b. Westplein ..	657
TWE	b. Saparcea ..	663	TZH	b. Dakar ..	657
TWF	b. Sembilan ..	663	TZI	b. Boschdijk ..	657
TWG	b. Madoera ..	661	TZJ	b. Burgerdijk ..	657
TWH	b. Manoeran ..	661	TZK	b. Blijdendijk ..	657
TWI	b. Mapia ..	661	TZL	b. Blommersdijk ..	656
TWJ	b. Singkep ..	664	TZM	b. Bildendijh ..	659
TKW	b. Moena ..	661	TZN	b. Nantes ..	549
TWL	b. Soemba ..	664	TZO	c. Swan Island ..	584
TWQ	b. Hermes TWQ ..	659	TZP	b. Arriluze ..	631
TWR	b. Haarlem ..	659	TZQ	c. Santa Marta ..	644
TWS	b. Hector ..	659	TZR	b. Orient UHB ..	630
TWT	b. Brielle ..	657	TZS	b. Alycon ..	630
TWU	b. Breda ..	657	TZT	b. Albert Gallus ..	645
TWV	b. Ares ..	656	TZU	b. PLM 7 ..	645
TWW	b. Achilles ..	655	UA	b. PLM 8 ..	667
TWX	b. Adonis ..	655	UBS	b. Tegucigalpa ..	667
TWY	b. Agamemnon ..	655	UCJ	b. Yoro ..	537
TWZ	b. Amor ..	656	UHB	c. Halifax Dockyard ..	538
TXA	b. Bacchus ..	656	UHC	c. Point Grey ..	535
TXB	b. Calypso ..	657	UHH	c. Cape Lazo ..	537
TXC	b. Clio ..	657	UHR	c. Pachena ..	537
TXD	b. Hercules ..	659	UHS	c. Estevan, British Columbia ..	536
TXE	b. Juno ..	659	VB	c. Alert Bay ..	535
TXF	b. Mercurius ..	661	VY	c. Triangle Island ..	536
TXG	b. Minerva ..	661	VAA	c. Dead Tree Point ..	537
TXH	b. Oberon ..	661	VAB	c. Ikeda Head ..	536
TXI	b. Pollux ..	662	VAC	c. Digby Island ..	536
TXJ	b. Saturnus ..	663	VAD	c. Gonzales Hill ..	535
TXK	b. Stella ..	664	VAE	c. Barrington Passage ..	537
TXL	b. Triton ..	665	VAF	c. Newcastle ..	537

		PAGE
VAP	b. Mina Brea ..	621
VAQ	b. Sharon VAQ ..	623
VAU	b. Schoolcraft ..	623
VAV	b. Chebucto Head ..	536
VAX	c. Canso DF ..	535
VAZ	c. Cape Race DF ..	569
VBA	c. Port Arthur, Ontario ..	538
VBB	c. Sault Ste. Marie, Ontario ..	538
VBC	c. Midland, Ontario ..	537
VBD	c. Tobermory, Ontario ..	538
VBE	c. Point Edward ..	537
VBF	c. Port Burwell ..	538
VBG	c. Toronto ..	538
VBH	c. Kingston, Ontario ..	537
VBI	b. Riverton ..	622
VBJ	b. Glenlyon ..	621
VBL	b. Glenfinnan ..	621
VBM	c. Le Pas, Manitoba ..	537
VBN	c. Port Nelson, Manitoba ..	538
VBP	b. Saguen ..	623
VBO	b. Royalite ..	623
VBR	b. Sarnolite ..	623
VBS	b. Icolite ..	621
VBX	b. Baleine ..	619
VCA	c. Montreal ..	537
VCB	c. Three Rivers, Quebec ..	538
VCC	c. Quebec ..	538
VCD	c. Gross Isle, Quebec ..	536
VCE	c. Cape Race ..	569
VCF	c. Father Point ..	536
VCG	c. Fame Point ..	536
VCH	c. Point Riche ..	569
VCI	c. Heath Point ..	537
VCJ	c. Harrington, Quebec ..	537
VCK	c. Clarke City ..	536
VCL	c. Point Amour ..	537
VCM	c. Belle Isle ..	569
VCN	c. Grindstone Island ..	530
VCO	c. North Sydney, Nova Scotia ..	537
VCP	c. Cape Bear ..	535
VCO	c. Pictou, Nova Scotia ..	537
VCR	c. Cape Ray ..	569
VCS	c. Camperdown, Nova Scotia ..	535
VCT	c. Sable Island ..	538
VCU	c. Cape Sable ..	535
VCV	c. Partridge Island ..	537
VCW	b. Montreal ..	622
VCY	b. Harold Dollar ..	621
VDA	b. Niobe VDA ..	622
VDB	b. Rainbow VDB ..	622
VDC	b. Canada VDC ..	620
VDD	b. Minto ..	621
VDE	b. Stanley ..	623
VDF	b. Lady Laurier ..	621
VDG	b. Aberdeen VDG ..	619
VDH	b. Druid ..	620
VDI	b. Earl Grey ..	622
VDJ	b. Montcalm VDJ ..	622
VDK	b. Montmagny ..	621
VDL	b. Lady Grey ..	622
VDM	b. Quadra ..	621
VDN	b. Estevan ..	621
VDO	b. Dollard ..	620

		PAGE			PAGE
VAP	b. Mina Brea ..	621	VDP	b. Newington ..	622
VAQ	b. Sharon VAQ ..	623	VDQ	b. Aranmore ..	619
VAU	b. Schoolcraft ..	623	VDR	c. Lurcher Lightship	537
VAV	c. Chebucto Head ..	536	VDS	b. Simcoe ..	623
VAX	c. Canso DF ..	535	VDI	b. Acadia ..	619
VAZ	c. Cape Race DF ..	569	VDU	b. Malaspina ..	621
VBA	c. Port Arthur, ..		VDV	b. Galiano ..	621
	Ontario ..	538	VDW	b. Margaret VDW ..	621
VBB	c. Sault Ste. Marie, ..		VDX	b. Lady Evelyn ..	621
	Ontario ..	538	VDY	b. Durlay Chine ..	620
VBC	c. Midland, Ontario ..	537	VDZ	b. Sheba ..	623
VBD	c. Tobermory, Ontario ..	538	VEA	b. Dalhousie City ..	620
VBE	c. Point Edward ..	537	VEB	b. Corona VEB ..	620
VBF	c. Port Burwell ..	538	VEC	b. Kingston ..	621
VRG	c. Toronto ..	538	VED	b. Toronto VED ..	623
VBH	c. Kingston, Ontario ..	537	VEE	b. Hazel Dollar ..	621
VBI	b. Riverton ..	622	VEF	b. Syracuse ..	623
VBJ	b. Glenlyon ..	621	VEG	b. Rapids King ..	622
VBL	b. Glenfinnan ..	621	VEH	b. Chippewa ..	620
VBM	c. Le Pas, Manitoba ..	537	VEI	b. Garden City ..	621
VBN	c. Port Nelson, ..		VEJ	b. Chicora ..	620
	Manitoba ..	538	VEK	b. Macassa ..	621
VBP	b. Saguena ..	623	VEL	b. Cayuga VEL ..	620
VBO	b. Royalite ..	623	VEM	b. Majestic VEM ..	621
VBR	b. Sarnolite ..	623	VEN	b. Turbinia ..	623
VBS	b. Icolite ..	621	VEO	b. Cascopedia ..	620
VBX	b. Baleine ..	619	VEP	b. Bellona VEP ..	620
VCA	c. Montreal ..	537	VET	b. G. R. Crowe ..	621
VCB	c. Three Rivers, ..		VEW	b. Glenshee ..	621
	Quebec ..	538	VEX	b. Charlton ..	620
VCC	c. Quebec ..	538	VEY	b. Reginald ..	622
VCD	c. Gross Isle, Quebec ..	536	VFA	b. Princess Adelaide ..	622
VCE	c. Cape Race ..	569	VFB	b. Princess Mary ..	622
VCF	c. Father Point ..	536	VFC	b. Princess Beatrice ..	622
VCG	c. Fame Point ..	536	VFD	b. Princess Alice ..	622
VCH	c. Point Riche ..	569	VFE	b. Princess Charlotte ..	622
VCI	c. Heath Point ..	537	VFF	b. Deliverance ..	620
V CJ	c. Harrington, Quebec ..	537	VFG	b. Princess Royal VFG	622
VCK	c. Clarke City ..	536	VFH	b. Princess May ..	622
VCL	c. Point Amour ..	537	VFI	b. Princess Sophia ..	622
VCM	c. Belle Isle ..	569	VFJ	b. Princess Ena VFJ	622
VCN	c. Grindstone Island ..	536	VFK	b. Tees ..	623
VCO	c. North Sydney, Nova ..		VFL	b. Prince Albert ..	622
	Scotia ..	537	VFM	b. Prince John ..	622
VCP	c. Cape Bear ..	535	VFN	b. Morwenna ..	622
VCQ	c. Pictou, Nova Scotia ..	537	VFO	b. Bessie Dollar ..	620
VCR	c. Cape Ray ..	569	VFP	b. Empire ..	620
VCS	c. Camperdown, Nova ..		VFQ	b. Alberta VFQ ..	619
	Scotia ..	535	VFS	b. Boston VFS ..	620
VCT	c. Sable Island ..	538	VFT	b. Florence ..	621
VCU	c. Cape Sable ..	535	VFU	b. Aquilo VFU ..	619
VCV	c. Partridge Island ..	537	VFV	b. Salvor ..	623
VCW	b. Montreal ..	622	VFW	b. A. W. Perry ..	619
VCY	b. Harold Dollar ..	621	VFR	b. Province ..	622
VDA	b. Niobe VDA ..	622	VFX	b. Lord Strathcona ..	621
VDB	b. Rainbow VDB ..	622		VFX ..	621
VDC	b. Canada VDC ..	620	VFZ	b. Camosun ..	620
VDD	b. Minto ..	621	VGA	b. Royal George VGA	623
VDE	b. Stanley ..	623	VGB	b. Royal Edward ..	623
VDF	b. Lady Laurier ..	621	VGC	b. Keewatin ..	621
VDG	b. Aberdeen VDG ..	619	VGD	b. Hamonic ..	621
VDH	b. Druid ..	620	VGE	b. Huronic ..	621
VDI	b. Earl Grey ..	620	VGF	b. Saronic ..	623
VDJ	b. Montcalm VDJ ..	622	VGG	b. Athabasca ..	619
VDK	b. Montmagny ..	622	VGH	b. Manitoba ..	621
VDL	b. Lady Grey ..	621	VGI	b. Assiniboia ..	619
VDM	b. Quadra ..	622	VGJ	b. Prince Arthur ..	622
VDN	b. Estevan ..	621	VGK	b. Prince George VGK	622
VDO	b. Dollard ..	620	VGL	b. S. Ignace ..	623

		PAGE			PAGE
VGM	b. Imperoyal ..	621	VJH	b. Loongana ..	611
VGM	b. Robert Dollar ..	622	VJI	b. Suva ..	612
VGN	b. Chelobsin ..	620	VJJ	b. Aramac ..	610
VGO	b. Evangeline VGO ..	621	VKN	b. Navy Office ..	612
VGP	b. Halifax ..	621	VJK	b. Gilgai ..	611
VGO	b. Everett G. Griggs ..	621	VJM	b. Charon ..	611
VGR	b. Douglas H. Thomas ..	620	VJO	b. Seang Bee ..	667
VGS	b. Solgar ..	623	VJP	b. Bulla ..	610
VG	b. Princess Maquinna ..	622	VJO	b. Bconah ..	610
VGU	b. Ontario No. 1 ..	622	VJR	b. Barambah ..	610
VG	b. Seal VGV ..	623	VJS	b. Bakara ..	610
VGW	b. Noronic ..	622	VJT	b. Boorara ..	610
VG	b. Yarmouth VGY ..	623	VJU	b. Hwah Ping ..	611
VGZ	b. Venture ..	623	VJV	b. Araluen ..	610
VGH	b. Princess Patricia ..	622	VJW	b. Dongarra ..	611
VHB	b. Levuka ..	611	VJY	b. Mindini ..	612
VHD	b. Kanowna ..	611	VJZ	c. Rabaul Radio ..	568
VHE	b. Karoola ..	611	VKI	b. Warra VKI ..	613
VHF	b. Bombala ..	610	VKO	b. Cerebus ..	610
VHI	b. Wandilla ..	613	VKP	b. Flinders Island base ..	611
VHK	b. Wodonga ..	613	VKQ	b. Garden Island base ..	611
VHL	b. Dimboola ..	611	VKR	b. Cockburn Sound base ..	611
VHM	b. Kangaroo ..	611	VKS	b. Port Stephens base ..	612
VHN	b. Katoomba ..	611	VKT	c. Nauru ..	565
VHO	b. Canberra ..	610	VKU	b. Parattah ..	612
VHP	b. Indarra ..	611	VKV	b. Arawatta ..	610
VHR	c. Maron ..	557	VKW	b. Gorgan VKW ..	611
VHQ	b. Fiona ..	611	VKX	b. Minderoo ..	612
VHS	b. Lady Loch ..	611	VKY	b. Marsina ..	611
VHT	b. Montoro ..	612	VKZ	b. Morialta ..	612
VHU	b. Mataram VHU ..	611	VLA	c. Awanui Radio ..	570
VHW	b. Wyandra ..	613	VLB	c. Awarua Radio ..	570
VHX	b. Victoria VHX ..	613	VLC	c. Chatham Islands ..	570
VHY	b. Ulimaroa ..	613	VLD	c. Auckland Radio ..	570
VIA	c. Adelaide Radio ..	525	VLE	b. Maheno ..	697
VIB	c. Brisbane Radio ..	525	VLF	b. Tofua ..	698
VIC	c. Cooktown Radio ..	525	VLG	b. Maunganui ..	698
VID	c. Darwin Radio ..	525	VLH	b. Kaipoi ..	697
VIE	c. Esperance Radio ..	526	VLI	b. Kaitangata ..	697
VIF	c. Woodlark Island ..	527	VLJ	b. Wahine ..	698
VIG	c. Port Moresby Radio ..	569	VLK	b. Makura ..	698
VIH	c. Hobart Radio ..	526	VLL	b. Talune ..	698
VII	c. Thursday Island ..	527	VLM	b. Moeraki ..	698
VII	Radio ..	527	VLN	b. Manuka ..	698
VII	c. Samarai Radio ..	569	VLO	b. Moana ..	698
VII	c. Flinders Island ..	526	VLP	b. Kurov ..	697
VII	Radio ..	526	VLR	b. Mamara ..	698
VIM	c. Melbourne Radio ..	526	VLT	b. Kaituna ..	697
VIN	c. Geraldton Radio ..	526	VLU	b. Atua ..	697
VIO	c. Broome Radio ..	525	VLV	b. Navua ..	698
VIP	c. Perth Radio ..	526	VLW	c. Wellington Radio ..	570
VIQ	c. Macquarie Island ..	526	VLX	b. Tutanekei ..	698
VIR	c. Rockhampton Radio ..	526	VLY	b. Palooa ..	698
VIS	c. Sydney Radio ..	527	VLZ	b. Maori ..	698
VIT	c. Townsville Radio ..	527	VMA	b. Arahura ..	697
VIU	c. Kieta ..	581	VMB	b. Karori ..	697
VIV	c. Madang Radio ..	569	VMC	b. Kauri ..	697
VIW	c. Wyndham Radio ..	527	VMD	b. Koromiko ..	697
VIY	c. Mount Gambier ..	526	VME	b. Rakanoa ..	698
VIY	Radio ..	526	VMF	b. Tarawera ..	698
VIZ	c. Roebourne Radio ..	526	VMG	c. Apia ..	579
VJA	b. Riverina ..	612	VMH	b. Terawhiti ..	698
VJB	b. Westralia ..	613	VMJ	b. Waitomo ..	699
VJC	b. Zealandia ..	613	VMK	b. Mokoia ..	698
VJD	b. Bingera ..	610	VML	b. Whangape ..	699
VJE	b. Cooma ..	611	VMM	b. Monowai ..	698
VJF	b. Morinda ..	612	VMN	b. Katoa ..	697
VJG	b. Wyreema ..	613	VMO	b. Waipori ..	698
			VMP	b. Wanaka ..	699

		PAGE		PAGE	
VMR	c. Rarotonga ..	541	VQR	c. Serenli ..	533
VMW	b. Waihora ..	698	VQS	c. San Kuri ..	533
VMX	b. Rotomahana ..	698	VQT	c. Wajheir ..	533
VMZ	b. Mararoa ..	698	VQU	c. Moyale ..	533
VNA	b. Ludwig Wiener ..	711	VQV	c. Sibu ..	580
VNC	c. Capetown ..	581	VQW	c. Sadung ..	580
VND	c. Durban ..	581	VQX	c. Burao ..	534
VNL	b. Africshore ..	711	VOY	c. Las Dureh ..	534
VNS	b. South Africa ..	711	VQZ	c. Fox Bay ..	546
VOA	c. Battle Harbour ..	535	VRE	b. Nile VRE ..	667
VOB	c. Venison Island ..	538	VRH	b. Energie ..	613
VOC	c. American Tickle ..	535	VRI	b. Parisian ..	619
VOD	c. Domino ..	536	VRJ	b. Powerful ..	615
VOE	c. Grady, Labrador ..	536	VSA	c. Hargeisa ..	534
VOF	c. Smokey Tickle ..	538	VSF	c. Nukualofa Radio ..	585
VOG	c. Holton, Labrador ..	537	VTB	c. Bushire ..	573
VOH	c. Cape Harrison ..	535	VTC	c. Basrah ..	573
VOI	c. Makkovik ..	537	VTD	c. Diamond Island ..	557
VOJ	c. Fogo ..	569	VTE	c. Bahrein ..	573
VOK	b. Ranger ..	697	VTH	c. Henjam ..	573
VOL	b. Glencoe ..	697	VTL	c. Lingah ..	573
VOM	b. Prospero ..	697	VTM	c. Maymyo ..	558
VON	b. Portia ..	697	VTP	c. Port Blair ..	558
VOO	b. Stella Maris ..	697	VTR	c. Rangoon Radio ..	558
VOP	b. Wellington VOP ..	697	VTT	c. Table Island ..	558
VOQ	b. Diana ..	697	VTV	c. Victoria Point ..	558
VOR	b. Kyle ..	697	VUB	b. Dufferin ..	667
VOU	b. Eagle VOU ..	697	VUC	b. Hardinge ..	667
VOV	b. Eskasoni ..	697	VUD	b. Northbrook ..	667
VOX	b. Neptune VOX ..	697	VUE	b. Arratoon Aparc ..	667
VPB	c. Colombo Radio ..	539	VUF	b. Gregory Aparc ..	667
VPC	c. Port Stanley ..	546	VUG	b. Japan ..	667
VPD	c. Suva ..	547	VUH	b. Hindu ..	763
VPE	c. Labasa ..	547	VUK	b. Noderi ..	667
VPF	c. Taveuni ..	547	VUL	b. Lightning ..	667
VPG	c. Accra ..	555	VUP	b. Patrick Stewart ..	667
VPI	c. Aden Radio ..	518	UUQ	b. Dara ..	667
VPJ	c. Berbera Radio ..	534	VUR	b. Catherine Aparc ..	667
VPK	c. Cocos ..	541	VUS	b. Shuja ..	667
VPL	c. Trinidad ..	534	VWA	c. Allahabad ..	557
VPM	c. Tobago ..	534	VWB	c. Bombay Radio ..	557
VPN	c. Nassau, Bahamas ..	428	VWC	c. Calcutta Radio ..	557
VPO	c. Barbados ..	534	VWD	c. Delhi ..	557
VPP	c. Belize ..	533	VWH	c. Mhow ..	558
VPO	c. Mombassa ..	533	VWJ	c. Simla ..	558
VPS	c. Cape D'Aguilar ..	557	VWK	c. Karachi Radio ..	557
VPT	c. Malta Island ..	565	VWL	c. Lahore ..	557
VPU	c. Sierra Leone ..	581	VWM	c. Madras Radio ..	557
VPV	c. Trois Amis ..	534	VWN	c. Nagpur ..	558
VPW	c. Singapore Radio ..	565	VWP	c. Peshawar ..	558
VPX	c. Penang Radio ..	565	VWQ	c. Quetta ..	558
VPY	c. Lagos ..	571	VWS	c. Sandheads ..	558
VPZ	c. Zanzibar ..	607	VWX	c. Secunderabad ..	558
VQA	c. Jessleton ..	533	VXA	b. Oonah ..	612
VQB	c. Sandakan ..	533	VXB	b. Bamba ..	610
VOC	c. Tawao ..	533	VXC	b. Cethana ..	611
VOD	c. Kudat ..	533	VXD	b. Talawa ..	612
VOE	c. Pemba, Zanzibar ..	607	VXE	b. Dilga ..	611
VOF	c. Kuching ..	580	VXF	b. Culburra ..	611
VQG	c. Toco, Trinidad ..	534	VXG	b. Challamba ..	611
VQH	c. S. Lucia ..	534	VXJ	b. Coolcha ..	611
VQI	c. Kingston, Jamaica ..	534	VXK	b. Bellata ..	610
VQJ	c. Tulagi ..	581	VXL	b. Shandon VXL ..	612
VQK	c. Ocean Island ..	555	VXM	b. Bundarra ..	610
VQL	c. Savu Savu ..	547	VXN	b. Ooma ..	612
VQN	c. Fanning Island ..	546	VXO	b. Bethanga ..	610
VQO	c. Washington Island ..	607	VXP	b. Dromana ..	611
VQP	c. Miri ..	580	VXQ	b. Rona ..	612
VQQ	c. Kismayu ..	533	VXS	b. Mawatta ..	611

VXT	b. Delungra ..	611	WAW	b. Admiral Watson ..	815
VXU	b. Dinoga ..	611	WAY	b. Admiral Dewey ..	814
VXV	b. Dumosa ..	611	WAZ	b. Admiral Schley ..	815
VXW	b. Dundula ..	611	WBA	b. S. Clara ..	917
VXX	b. Mackarra ..	611	WBB	b. S. Cecilia ..	917
VXY	b. Macumba ..	611	WBC	b. S. Calalina ..	917
VYA	b. Erik ..	697	WBD	b. S. Cruz WBD ..	917
VYB	b. Terra Nova ..	697	WBE	b. Cacique ..	827
VYC	b. Viking ..	697	WBF	b. Boston WBF ..	592
VYD	b. Sagona ..	697	WBG	b. Lake Mohonk ..	867
VYQ	b. Fogota ..	697	WBG	b. Venezuela WBG ..	922
VYS	b. Cabot ..	697	WBH	b. Columbia WBH ..	833
VYT	b. Meigle ..	697	WBJ	b. S. Barbars ..	917
VYV	b. Lady Sybil ..	697	WBK	b. Saucon ..	897
VYW	b. Thetis ..	697	WBM	b. Redondo WBM ..	894
VYE	b. Seal VYE ..	697	WBN	b. Ecuador ..	842
VYF	b. Ethie ..	697	WBO	b. S. Rosa ..	918
VYP	b. Petrol ..	697	WBP	b. Hermosa ..	853
VYX	b. Susu ..	697	WBQ	b. S. Paula ..	918
VYY	b. Cachalot ..	697	WBR	b. S. Rita WBR ..	918
VYZ	b. Port Saunders ..	697	WBT	b. Binghamton ..	592
VZA	b. Rupara ..	612	WBU	c. Hoboken, New Jer- sey ..	597
VZB	b. Makambo ..	611		b. Cabrillo ..	826
VZC	b. Paringa ..	612	WBV	c. Burwood WBW ..	593
VZD	b. Pateaena ..	612	WBW	b. S. Ana WBX ..	917
VZE	c. King Island ..	526	WBX	b. S. Elena ..	917
VZF	b. Flora ..	697	WBZ	b. Tionesta ..	920
VZG	b. Governor Musgrave ..	611	WCA	b. Juniata WCB ..	859
VZH	b. Karuah ..	611	WCB	b. Octorara WCD ..	882
VZK	c. Morobe Radio ..	569	WCD	b. Parthian ..	885
VZM	b. Carina ..	610	WCE	b. Favorite WCF ..	845
VZN	b. Yankalilla ..	613	WCF	c. Brooklyn WCG ..	593
VZO	c. Manus ..	518	WCG	b. Huron WCH ..	855
VZP	b. Australpool ..	610	WCH	c. Newport WCI ..	603
VZQ	b. Australcrag ..	610	WCI	b. Anyox ..	817
VZR	c. Kawieng ..	570	WCJ	b. Westchester ..	925
VZS	b. Australpeak ..	610	WCL	b. Northland WCN ..	881
VZT	b. Australport ..	610	WCN	b. Wyandotte WCO ..	931
VZU	b. Australfield ..	610	WCO	b. Casco ..	829
VZV	b. Calulu ..	610	WCP	b. Roy Hooper ..	893
VZW	b. Australmead ..	610	WCQ	b. Harvester (The) ..	852
VZX	c. Eitape Radio ..	569	WCR	b. Alpena ..	816
VZY	b. Australmout ..	610	WCS	b. Coneaut ..	834
W	c. Munster Ruhr ..	553	WCU	b. Limit (The) ..	869
WD	c. Puerto Bernejo ..	525	WCV	b. Woonsocket ..	930
WH	c. Frankfort-on-Maine ..	553	WCW	c. Cleveland WCX ..	594
WAA	b. Alameda WAA ..	815	WCX	b. Levi G. Burgess ..	869
WAB	b. Saugerties ..	897	WCX	b. Illinois WCZ ..	886
WAC	b. Chicago WAC ..	831	WCZ	b. Pere Marquette ..	886
WAD	b. Victoria WAD ..	923	WDA	b. Pere Marquette 19 ..	886
WAE	b. Ketchikan ..	861	WDB	b. Pere Marquette 17 ..	886
WAF	b. Admiral Farragut ..	814	WDC	b. Pere Marquette 18 ..	886
WAG	b. Admiral Sebree ..	815	WDD	b. Pere Marquette 20 ..	886
WAH	b. Dora WAH ..	839	WDE	b. Lake Oneida ..	867
WAI	b. Latouche ..	869	WDF	b. Otsego ..	884
WAJ	b. Jefferson WAJ ..	858	WDG	b. Petoskey ..	887
WAK	b. Valdez ..	922	WDH	b. Lakelport WDJ ..	867
WAL	b. S. Ana WAL ..	917	WDJ	b. Lakewood WDK ..	867
WAM	b. Juneau ..	859	WDK	b. Lakeland WDL ..	817
WAN	b. Northwestern WAN ..	881	WDL	b. Ann Arbor No. 3 ..	817
WAO	b. Rajah WAO ..	890	WDN	b. Ann Arbor No. 4 ..	817
WAP	b. Lake Crescent ..	863	WDO	b. Ann Arbor No. 5 ..	817
WAQ	b. Democracy ..	838	WDP	b. Ann Arbor No. 6 ..	595
WAR	c. Warsaw ..	575	WDQ	c. Detroit WDR ..	831
WAR	b. Cordova ..	834	WDR	b. City of Grand Rapids ..	888
WAS	b. Chester Sun ..	830	WDS	b. Puritan WDU ..	831
WAT	b. Skagway ..	899	WDU	b. City of Benton Harbor ..	831
WAU	b. Point Loma ..	887	WDV		
WAV	b. Philippines ..	887			

WDX	b. Lake Tulare ..	868	WDX	b. Lake Tulare ..	868
WDZ	b. Aramis ..	818	WDZ	b. Aramis ..	818
WEA	b. City of Cleveland III ..	831	WEA	b. City of Cleveland III ..	831
WEB	b. City of Mackinac II ..	831	WEB	b. City of Mackinac II ..	831
WEC	b. City of Detroit II ..	831	WEC	b. City of Detroit II ..	831
WED	b. Western States ..	926	WED	b. Western States ..	926
WEE	b. Eastern States ..	926	WEE	b. Eastern States ..	926
WEF	b. City of Detroit III ..	831	WEF	b. City of Detroit III ..	831
WEG	b. City of St. Ignace ..	832	WEG	b. City of St. Ignace ..	832
WEH	b. City of Alpena II ..	831	WEH	b. City of Alpena II ..	831
WEI	b. E. J. Earling ..	843	WEI	b. E. J. Earling ..	843
WEJ	b. Samuel Mitchell ..	896	WEJ	b. Samuel Mitchell ..	896
WEK	b. Minnesota WEK ..	875	WEK	b. Minnesota WEK ..	875
WEL	b. C. A. Smith ..	829	WEL	b. C. A. Smith ..	829
WEM	b. Susquehanna WEM ..	917	WEM	b. Susquehanna WEM ..	917
WEN	b. North American ..	881	WEN	b. North American ..	881
WEO	b. South American ..	900	WEO	b. South American ..	900
WEP	b. Western King ..	926	WEP	b. Western King ..	926
WEQ	b. Montrolite ..	876	WEQ	b. Montrolite ..	876
WER	b. Puget Sound ..	888	WER	b. Puget Sound ..	888
WES	b. Point Adams ..	887	WES	b. Point Adams ..	887
WET	b. West Gotomaska ..	927	WET	b. West Gotomaska ..	927
WEU	b. Western Star ..	926	WEU	b. Western Star ..	926
WEV	c. Conneaut Harbor ..	594	WEV	c. Conneaut Harbor ..	594
WEW	b. Marquette ..	872	WEW	b. Marquette ..	872
WEX	Bessemer No. 1 ..	872	WEX	Bessemer No. 1 ..	872
WEY	Bessemer No. 2 ..	872	WEY	Bessemer No. 2 ..	872
WEZ	b. General William M. Graham ..	849	WEZ	b. General William M. Graham ..	849
WFA	b. Ashtabula WEZ ..	819	WFA	b. Ashtabula WEZ ..	819
WFB	b. Georgia WFA ..	849	WFB	b. Georgia WFA ..	849
WFC	b. Alabama WFB ..	815	WFC	b. Alabama WFB ..	815
WFE	b. Indiana WFC ..	856	WFE	b. Indiana WFC ..	856
WFF	b. Carolina ..	828	WFF	b. Carolina ..	828
WFG	b. Franklin WFF ..	847	WFG	b. Franklin WFF ..	847
WFJ	b. Arizona WFG ..	818	WFJ	b. Arizona WFG ..	818
WFL	b. Christopher Columbus ..	831	WFL	b. Christopher Columbus ..	831
WFN	b. Lake Arthur ..	862	WFN	b. Lake Arthur ..	862
WFP	b. Lake Butler ..	863	WFP	b. Lake Butler ..	863
WFO	b. City of Erie ..	831	WFO	b. City of Erie ..	831
WFR	b. City of Buffalo ..	831	WFR	b. City of Buffalo ..	831
WFS	b. State of Ohio ..	903	WFS	b. State of Ohio ..	903
WFT	b. Secandbee ..	897	WFT	b. Secandbee ..	897
WFW	b. Charles O. Jenkins ..	830	WFW	b. Charles O. Jenkins ..	830
WFX	b. F. B. Squire ..	845	WFX	b. F. B. Squire ..	845
WFG	b. Sir Thomas Shaugnessy ..	899	WFG	b. Sir Thomas Shaugnessy ..	899
WFX	b. Manitou WFW ..	871	WFX	b. Manitou WFW ..	871
WFZ	b. Missouri WFX ..	875	WFZ	b. Missouri WFX ..	875
WGA	b. Coronado WFZ ..	835	WGA	b. Coronado WFZ ..	835
WGC	b. City of Seattle ..	832	WGC	b. City of Seattle ..	832
WGD	b. W. F. White ..	928	WGD	b. W. F. White ..	928
WGE	b. Oregon WGD ..	883	WGE	b. Oregon WGD ..	883
WGG	b. Spokane ..	903	WGG	b. Spokane ..	903
WGH	c. Tuckerton, N.J. ..	605	WGH	c. Tuckerton, N.J. ..	605
WGJ	b. Burnside WGH ..	826	WGJ	b. Burnside WGH ..	826
WGL	b. Northland WGJ ..	881	WGL	b. Northland WGJ ..	881
WGM	b. Curacao ..	836	WGM	b. Curacao ..	836
WGN	b. Dreadnought ..	839	WGN	b. Dreadnought ..	839
WGO	b. Undaunted WGM ..	922	WGO	b. Undaunted WGM ..	922
WGP	b. Carl D. Bradley ..	828	WGP	b. Carl D. Bradley ..	828
WGO	c. Chicago WGO ..	594	WGO	c. Chicago WGO ..	594
WGR	b. President ..	888	WGR	b. President ..	888
WGS	b. City of Puebla ..	831	WGS	b. City of Puebla ..	831
WGT	b. Governor WGR ..	850	WGT	b. Governor WGR ..	850
	b. Senator WGS ..	897		b. Senator WGS ..	897
	b. Western Pride ..	926		b. Western Pride ..	926

PAGE			PAGE
868	WGW	b. Kerowlee	860
818	WGX	b. Queen	889
831	WGY	b. City of Topeka ..	832
831	WGZ	b. Guardian	851
831	WHB	c. New York WHB ..	603
926	WHC	b. Columbia WHC ..	833
842	WHE	c. Philadelphia WHE	603
831	WHF	b. Callao WHF	827
832	WHG	b. W. F. Burrows ..	928
831	WHH	b. Mount Shasta ..	877
843	WHI	c. New York WHI ..	603
896	WHJ	b. Sierra WHJ	898
875	WHL	b. Ventura	922
829	WHM	b. Sonoma WHM	900
917	WHN	b. S. Isabel WHN ..	917
881	WHP	b. Point Arena	887
900	WHR	b. Abner Coburn	814
926	WHS	b. Stanley Dollar ..	903
876	WHT	b. Whittier	929
888	WHU	b. Balboa WHU	820
887	WHV	b. Velero	922
927	WHX	b. Humbolt	855
926	WHZ	b. Johanna Smith ..	858
594	WIA	b. Silver Shell	899
	WIC	b. Pearl Shell	885
872	WID	b. Charles E. Harwood	829
	WIE	b. Edward L. Doheny	843
872	WIE	b. Gold Shell	849
	WIF	b. Herbert G. Wylie ..	853
849	WIG	b. Norma Bridge	880
819	WIH	b. C. A. Canfield ..	826
849	WII	c. Belmar	592
815	WII	c. New Brunswick ..	602
856	WIJ	b. Edward L. Doheny,	
828		Jr.	843
847	WIK	b. Providencia	888
818	WIL	b. Jim Butler	858
	WIM	b. Northern Pacific ..	881
831	WIN	b. Colusa	833
862	WIO	b. Esperanca	844
863	WIP	b. Carmen WIP	828
831	WIQ	b. Frederic R. Kellogg	847
831	WIR	b. Great Northern ..	850
903	WIS	b. E. R. Sterling ..	844
897	WIT	b. Geo. G. Henry ..	849
830	WIU	b. Restorer	891
845	WIW	b. J. M. Danziger ..	858
	WIX	b. Harold Walker ..	852
899	WIY	b. William Green ..	929
871	WJA	b. Andalusia	817
875	WJB	b. Kermoor	860
835	WJC	b. Keresan	860
832	WJD	b. Anna WJD	817
928	WJF	b. Teresa WJF	919
883	WJG	b. Moccasin	875
903	WJH	b. Clara	832
605	WJI	c. Atka, Alaska	518
826	WJJ	b. Florida WJJ	846
881	WJL	b. Wachusett	923
836	WJM	b. J. C. Donnell ..	857
839	WJN	b. Munaires	877
922	WJO	b. Nyanza WJO	881
828	WJP	b. Tunica	921
594	WJQ	b. Western Front ..	926
888	WJR	b. W. M. Tupper ..	930
831	WJS	b. Amphion	817
850	WJU	b. Osage	883
897	WJV	b. Guaro	851
926	WJW	b. Wyandotte WJW..	931

		PAGE			PAGE
WKA	b. Alaskan ..	815	WNG	b. Otto M. Reiss ..	884
WKB	b. Arizonan ..	819	WNH	b. Clemens A. Reiss ..	832
WKD	b. Dakotan ..	837	WNI	b. William A. Reiss ..	929
WKE	b. Kentuckian ..	860	WNK	b. Richard J. Reiss ..	891
WKF	b. American WKF ..	817	WNL	b. Lake St. Clair ..	867
WKG	b. S. M. Spalding ..	809	WNM	b. Florence Luckenbach ..	846
WKH	b. Hollywood ..	854	WNP	b. Pleiades ..	887
WKJ	b. Iowan ..	856	WNO	b. Wilhelm Jebsen ..	929
WKK	b. Isaac L. Rice ..	856	WNR	b. Rush ..	893
WKL	b. Mexican ..	874	WNS	b. Kvichak ..	861
WKM	b. Minnesotan ..	875	WNU	c. New Orleans WNU ..	602
WKO	b. Oregonian ..	883	WNV	b. Hatteras ..	853
WKP	b. Pennsylvanian ..	886	WNW	b. S. Ramon ..	918
WKQ	b. Ohioan ..	882	WNX	b. Peter Reiss ..	887
WKR	b. Panaman ..	884	WNY	b. John F. Reiss ..	858
WKS	b. West Arroe ..	925	WNY	c. New York WNY ..	603
WKT	b. Texan ..	919	WNZ	b. F. J. Luckenbach ..	845
WKU	b. Hawaiian ..	853	WOA	b. Admiral Rodman ..	815
WKV	b. Virginian WKV ..	923	WOC	b. Oregon WOC ..	883
WKW	b. Absaroka ..	814	WOE	b. Hercules WOE ..	853
WKX	b. Westward Ho ..	928	WOF	b. Horace X. Baxter ..	855
WKY	b. Montoso ..	876	WOG	b. Fred Baxter ..	847
WKZ	b. Canoga ..	827	WOI	c. Akron, Ohio ..	591
WLA	b. Benj. F. Panchard ..	822	WOJ	b. Iris WOJ ..	856
WLB	b. Tacony ..	919	WOK	c. Detroit, Michigan ..	595
WLC	c. New London ..	602	WOL	b. Angeles (Los) ..	817
WLE	b. Maitland No. 1 ..	871	WOM	b. William A. Mc. Kenney ..	929
WLF	b. Coosa ..	834	WON	b. Brea (La) ..	825
WLG	b. Wacouta ..	923	WOO	b. Idaho WOO ..	855
WLH	b. Fort Bragg ..	846	WOP	b. Lake Elizabeth ..	863
WLI	b. Westbrook ..	925	WOQ	b. Lakeport WOQ ..	867
WLJ	b. Monticello ..	876	WOT	b. Coalinga ..	832
WLL	b. Greenwood ..	850	WOU	b. Oregon WOU ..	883
WLM	b. Erny ..	844	WOV	b. Venetia ..	922
WLN	b. Black Arrow ..	823	WOW	b. Henry J. Biddle ..	853
WLO	b. Orion ..	883	WOY	b. Queen II ..	889
WLP	b. Bustamente ..	826	WPA	b. Ituna ..	857
WLQ	b. Sabine Sun ..	805	WPB	b. Northbend ..	881
WLR	b. Floridian ..	816	WPC	b. Tyee WPC ..	921
WLS	b. Princess Matoika ..	888	WPE	b. Tatoosh ..	919
WLT	b. Neuse ..	879	WPF	c. Providence, R.I. ..	604
WLU	b. Pawnee WLU ..	885	WPH	b. S. M. Fischer ..	899
WLV	b. Ida WLV ..	855	WPI	b. Kerkenna ..	860
WLX	b. Pequot ..	886	WPK	b. Florence Olson ..	846
WLY	b. Suwanee WLY ..	917	WPL	b. Seafarer ..	897
WMA	b. Multnomah ..	877	WPM	b. Kerwood ..	861
WMD	b. West Shore ..	928	WPN	b. Pioneer WPN ..	887
WMF	b. Celilo ..	829	WPO	c. Carney's Point ..	594
WMG	b. Wapama ..	924	WPP	c. Wilmington, Delaware ..	606
WMI	b. Minnesota WMI ..	875	WPQ	b. Zapora ..	931
WMJ	b. Ernest H. Meyer ..	844	WPR	c. Ensenada ..	576
WMK	b. Hyades ..	855	WPS	b. Starr ..	903
WML	b. Lurline ..	870	WPT	c. Wells, Minnesota ..	606
WMM	b. Freeman ..	847	WPU	c. New Prague ..	602
WMN	b. Enterprise ..	843	WPV	b. H. M. Whitney ..	854
WMO	b. Wilhelmmina ..	929	WPW	b. James S. Whitmey ..	857
WMP	b. Matsonia ..	873	WPX	b. Oneonta ..	883
WMQ	b. Manoa ..	872	WPY	b. Wallula ..	924
WMR	b. Maui ..	873	WQA	b. Inco No. 1 ..	856
WMS	b. Wahkeena ..	923	WQC	b. Fayette Brown ..	845
WMT	b. Point Bonita ..	887	WQD	b. Hisko ..	854
WMV	b. Appeles ..	818	WQE	b. Harvey H. Brown ..	852
WMY	b. A. M. Byers ..	817	WQF	b. Harry W. Croft ..	852
WMZ	b. Honolulu ..	854	WQH	b. M. A. Bradley ..	870
WNB	b. Captain WNB (El) ..	828	WQI	b. Costa Rica ..	835
WNC	b. Wabash ..	923	WQJ	b. Sarah Weems ..	896
WND	b. Windber ..	929	WQK	b. Francis L. Skinner ..	847
WNE	b. Nushagak ..	881			
WNF	b. Hattie Luckenbach ..	853			

PAGE			PAGE
597	WTQ	b. Segundo (El) ..	897
606	WTR	b. Richmond ..	891
593	WTS	b. Col. E. L. Drake ..	833
891	WTT	b. Atlas ..	819
878	WTU	b. S. O. Co. No. 91 ..	899
819	WTV	b. Captain A. F. Lucas ..	828
924	WTV	b. Tamesi ..	919
895	WTW	b. Ossineke ..	883
602	WTX	b. Asuncion ..	819
857	WTY	b. S. O. Co. No. 93 ..	899
931	WTZ	b. S. O. Co. No. 95 ..	899
926	WUA	c. Fort Andrews ..	595
882	WUB	c. Fort Hancock, New Jersey ..	595
823	WUC	c. Fort H. G. Wright ..	596
899	WUD	c. Fort Leavenworth ..	596
838	WUE	c. Fort Levett ..	596
857	WUF	c. Fort Monroe ..	596
817	WUH	c. Fort McIntosh ..	596
817	WUI	c. Fort Riley ..	596
814	WUJ	c. Fort Sam Houston ..	596
877	WUK	c. Fort Stevens ..	596
819	WUL	c. Fort Totten ..	597
898	WUM	c. Fort Wood ..	597
875	WUN	c. Fort Worden ..	597
872	WUO	c. Fort Winfield Scott ..	597
916	WUQ	c. Washington WUQ ..	605
849	WUR	c. Fort Morgan, Alabama WUR ..	596
816	WUS	c. Fort Rosecrans ..	596
884	WUT	c. Fort Caswell ..	595
890	WUU	c. Fort Adams ..	595
845	WUV	c. Brooks, Alaska ..	519
891	WUX	c. Fort Crockett ..	595
603	WUY	c. Fort San Jacinto ..	596
863	WUZ	c. Fort Brown, Texas ..	595
881	WVA	c. Circle City ..	519
892	WVB	c. Fairbanks, Alaska ..	519
917	WVC	c. Fort Egbert ..	519
917	WVD	c. Fort Gibbon, Alaska ..	519
604	WVE	c. Fort St. Michael ..	519
845	WVF	c. Kotlik ..	520
829	WVG	c. Nome, Alaska ..	521
594	WVH	c. Nulato ..	521
601	WVI	c. Petersburg, Alaska ..	521
927	WVJ	c. Wrangell ..	522
923	WVK	c. Holy Cross, Alaska ..	519
891	WVL	c. Fort Frank ..	574
918	WVM	c. Fort Hughes ..	575
604	WVN	c. Fort Mills WVN ..	575
891	WVO	c. Davao ..	574
929	WVP	c. Fort Drum ..	574
861	WVQ	c. Fort Wm. McKinley ..	575
825	WVR	c. Fort Wint ..	575
857	WVS	c. Jolo ..	575
818	WVT	c. Malabang ..	575
868	WVU	c. Manila ..	575
883	WVV	c. Puerto Princesa ..	575
928	WVW	c. Zamboanga ..	575
918	WVX	c. Cuyo ..	574
927	WVY	c. S. José, Mindoro ..	575
829	WVZ	c. Fort Mills WVZ ..	575
917	WWA	b. China WWA ..	831
857	WWB	b. Beaver WWB ..	822
870	WWC	b. Western Wave ..	926
930	WWD	b. Arcadia ..	818
930	WWE	b. Manchuris ..	871
847	WWF	b. City of Para ..	831
605	WWG	c. Chicago WWG ..	594

		PAGE			PAGE			PAGE
WWH	b. Newport WWH	879	WYS	b. General G. W.		WCAO	b. Caponka	828
WWJ	b. Peru WWJ	886		Gettley	848	WCAU	b. Chelan	830
WWK	b. Western Queen	926	WYT	b. Captain A. M.		WCEA	b. Cotteral	835
WWL	b. S. Jose WWL	918		Wetherill	828	WCEE	b. Kuwa	861
WWM	b. S. Juan WWM	918	WYU	b. General Robert W.		WCEI	b. Maratanza	872
WWN	b. Mongolia	876		Swartoot	848	WCEO	b. Mattapan	873
WWP	b. Ausable	819	WYV	b. General S. B. Holo-		WCIA	b. Bellingham	822
WWQ	c. Bellefonte	592		baird	849	WCIE	b. Eastport	842
WWR	c. Waw	584	WYW	b. General R. H. Jack-		WCIO	b. Invincible	856
WWR	b. Rose City	892		son	848	WCIU	b. Lake Lemando	867
WWS	b. Alaska WWS	815	WYX	c. Fort Washington	597	WCOA	b. Naiwa	878
WWT	b. Nuuanu	881	WYX	c. Tientsin	540	WCOE	b. Battahatchee	821
WWU	c. Newark	602	WYY	b. General Richard		WCOI	b. Socony 84	899
WWV	c. Washington WWV	605		Arnold	848	WCOO	b. Socony 92	899
WWY	b. Slocum	899	WYZ	b. Captain T. M.		WCOU	b. Liberty WCOO	869
WWZ	b. Mariana	872		Morrison	828	WCUA	b. Lake Kyttle	867
WXA	b. Buford WXA	826	WZA	c. Fort Screven	596	WCUE	b. Lake Forsby	865
WXB	b. Crook	836	WZB	c. Fort Howard	596	WCUI	b. Lake Fossil	865
WXC	b. Dix	838	WZC	c. Fort Whitman	597	WCUO	b. Lake Frampton	865
WXD	b. Kilpatrick	861	WZD	c. Fort Barrancas	595	WCUU	b. Lake Franconia	865
WXE	b. Liscum	869	WZE	c. Fort Constitution	595	WDA	b. Lake Fray	865
WXF	b. Logan	870	WZF	c. Fort Moultrie	596	WDAE	b. Munra	877
WXI	b. Merritt	874	WZG	c. Fort de Russy	556	WDAO	b. Musketo	877
WXJ	b. Sheridan WXJ	898	WZH	c. Honolulu	556	WDAU	b. Herman Winter	853
WXK	b. Sherman WXK	898	WZJ	c. Fort Casey	595	WDEA	b. Wanzu	924
WXL	c. Iditarod	520	WZK	c. Fort Dade	595	WDEE	b. Wihaha	929
WXM	b. Thomas WXM	920	WZL	c. Buckroe	593	WDEI	b. Andra	817
WXN	b. Warren	924	WZM	c. Anderson, Virginia	591	WDEO	b. Crawkeys	836
WXP	c. Fort Craig	519	WZN	c. Fort Dupont	595	WDEU	b. Steadfast	903
WXQ	c. Fort Travis	597	WZO	c. Fort Bliss	595	WDIA	b. Bayamo	821
WXR	c. Fort St. Philip	596	WZP	c. Fort Huachuca	596	WDIA	b. South Pole	900
WXR	b. Burnside WXR	826	WZQ	b. General Timothy Pic-		WDIE	b. Waken	923
WXS	b. Cyrus W. Field	837		kering	849	WDII	b. Wathena	924
WXT	b. Joseph Henry	858	WZR	b. General Nathaniel		WDIO	b. Watonwan	924
WXU	b. Navesink	879		Greene	848	WDIU	b. Westmead	927
WXV	c. McGrath, Alaska	521	WZS	b. Henry Wilson	853	WDOA	b. West View	928
WXW	b. General John M.		WZT	b. General George H.		WDOE	b. Agwidale	928
	Schofield	848		Weeks	848	WDOI	b. Auburn	815
WXX	c. Fort Yukon, Alaska	519	WZU	b. Sprigg Carroll	903	WDOO	b. Cape May	827
WZZ	c. Fort Story	597	WZV	b. General J. M. Bran-		WDOU	b. Federal	845
WYA	b. General Royal T.			non	848	WDUA	b. Fort Wayne	846
	Frank	849	WZW	b. General R. N.		WDUE	b. Lake Frazee	865
WYB	b. General S. N. Mills	849		Batchelder	848	WDUI	b. Redlands	891
WYC	b. Major Samuel Ring-		WZY	b. Major Guy Howard		WDUO	b. Lake Freeborn	865
	gold	871	WZZ	b. S. Pedro	899	WDUU	b. Lake Freed	865
WYD	b. General Henry J.		WBAA	b. Snug Harbor	853	WEBB	b. Lake Freeland	865
	Hunt	848	WBAI	b. Heffron	814		c. Camp Vail, N.J.	
WYE	b. General Henry Knox	848	WBAU	b. Addison	815	WEBC	c. Camp Vail, N.J.	593
WYF	b. General E. O. C. Ord	848	WBEA	b. Adway	815	WEBD	c. Camp Vail, N.J.	593
WYG	b. Colonel George Ar-		WBEE	b. Afalkey	815	WEBF	c. Camp Vail, N.J.	593
	mistead	833	WBEI	b. Airle	819	WEBG	c. Camp Vail, N.J.	593
WYH	b. General Robert		WBEO	b. Ashburn	823		b. WEBG	
	Anderson	848	WBEU	b. Benvola	831	WEOI	b. Osakis	593
WYI	b. Captain Charles W.		WBIA	b. Chipchung	895	WFAA	b. Namecki	883
	Rowell	828	WBIE	b. Sagamore	810	WFAI	b. West Galeta	878
WYJ	b. General A. M. Randal	848	WBII	b. Alpace	821	WFAO	b. Western Hope	926
WYK	b. General Harvey		WBIO	b. Baxley	885	WFEA	b. West Hobomac	926
	Brown	848	WBIU	b. Pascagoula	876	WFEF	b. Volunteer	927
WYL	b. General R. B. Ayres	848	WBOA	b. Mono	919	WFEI	b. Eastern King	923
WYM	b. Captain James For-		WBOE	b. Texas WBOE	837	WFEO	b. Winding Gulf	842
	nance	828	WBOI	b. Dania WBOI	879	WFEE	b. West Hosokie	929
WYN	b. Reno WYN	891	WBOU	b. Nashotah	866	WFUI	b. Westport	927
WYO	b. Major Evan Thomas	871	WBUA	b. Lake Gravity	866	WFUE	b. Matanzas	928
WYP	b. Captain Gregory Bar-		WBUE	b. Lake Greenbrier	866	WFIE	b. Canton	873
	rett	828	WBUU	b. Lake Grogan	865	WFII	b. Major Wheeler	827
WYQ	b. Major Albert G.		WCAA	b. Lake Forney	823			
	Gorse	871	WCAE	b. Bobbing	824			
WYR	b. Lieut. Geo. M.		WCAI	b. Bottineau	824			
	Harris	869		b. Boughton				

PAGE			PAGE
828	WFIO	b. Bloomington ..	823
830	WFIU	b. Cerrito ..	829
835	WFOA	b. Hickman ..	854
861	WFOE	b. Lewis Luckenbach ..	869
872	WFOO	b. William N. Page ..	929
873	WFOU	b. Phoenix Bridge ..	887
822	WFUA	b. Lake Freezout ..	865
842	WFUE	b. Lake Frenchton ..	865
856	WFUI	b. Chas. R. Van Hise ..	830
867	WFUO	b. Lynchburg ..	870
878	WFUU	b. Oskosh ..	883
821	WGAA	b. Englewood ..	843
899	WGAE	b. Galesburg ..	847
899	WGAI	b. Morristown ..	877
869	WGAO	b. W. S. Rheem ..	930
867	WGAU	b. Laforge ..	862
865	WGEA	b. Easterner ..	842
865	WGEE	b. Alvada ..	816
865	WGEI	b. East Indian ..	842
865	WGEO	b. Ocland ..	882
865	WGEU	b. Seypen ..	898
877	WGIA	b. West Grama ..	927
877	WGIE	b. Nantahala ..	878
853	WGIO	b. Saris ..	896
924	WGIU	b. Kinta ..	861
929	WGOA	b. Piave WGOA ..	887
817	WGOE	b. Polar Bear ..	887
836	WGOI	b. Sacarappa ..	893
903	WGOO	b. Waubesa ..	925
821	WGOU	b. West Gressy ..	926
900	WGUA	b. Oskawa ..	883
923	WGUE	b. Itanca ..	857
924	WGUI	b. Brandywine ..	824
924	WGUO	b. Kusdeca ..	861
927	WGUU	b. Wayhut ..	925
928	WIGM	b. Greene ..	850
815	WJAA	b. Sangamon ..	896
819	WJAE	b. Hokah ..	854
827	WJAI	b. Yuma ..	931
845	WJAO	b. M. J. Scanlon ..	875
846	WJAU	b. Aurora ..	819
865	WJEA	b. Mojave ..	875
891	WJEE	b. Red Cloud ..	891
865	WJEI	b. Plainfield ..	887
865	WJEO	b. Phoenix WJEO ..	887
865	WJEU	b. Panga ..	885
	WJIA	b. West Zucker ..	928
593	WJIE	b. Guimba ..	851
	WJII	b. Oskaloosa ..	883
593	WJIO	b. Independence ..	856
	WJIU	b. Schenectady ..	897
593	WJOA	b. West Elcasco ..	926
	WJOE	b. West Eldara ..	926
593	WJOI	b. West Loquassuck ..	927
	WJOO	b. West Madaket ..	927
593	WJOU	b. West Kyska ..	927
883	WJUA	b. Fort Pierce ..	846
878	WJUE	b. Fort White ..	846
926	WJUI	b. Cohasset ..	833
926	WJUO	b. Magunkook ..	871
927	WJUU	b. Bulana ..	826
923	WKAE	b. Socony 85 ..	899
842	WKAI	b. Lake Zaliski ..	868
929	WKAO	b. Lake Pickaway ..	867
927	WKAU	b. Lake Copley ..	863
928	WKEA	b. Lake Deval ..	863
873	WKEE	b. Lake Cahoon ..	863
827	WKEI	b. Lake Ypsilanti ..	868
871	WKEO	b. Goodspeed ..	850

		PAGE			PAGE
WKEU	b. Borges ..	824	WNAI	b. Craycroft ..	836
WKIA	b. Fish Hawk WKIA ..	845	WNAO	b. Lake Callicoon ..	863
WKIE	b. Bonham ..	823	WNAU	b. Lake Fresco ..	865
WKII	b. Eastern Light ..	842	WNEA	b. Lake Charlottesvile ..	863
WKIO	b. Eastern Shore ..	842	WNEO	b. Dio ..	838
WKIU	b. Eastern Cross ..	842	WNEU	b. Coweta ..	835
WKOA	b. Zaca ..	931	WNIA	b. Cruso ..	836
WKOE	b. Falmouth ..	845	WNIE	b. Agawam ..	815
WKOI	b. Cumberland WKOI ..	835	WNII	b. Challenger ..	829
WKOQ	b. Connersville ..	834	WNIO	b. Python ..	889
WKOQ	b. Central American ..	829	WNIU	b. Cornucopia ..	834
WKUA	b. Darum ..	837	WNOA	b. Allenhurst ..	816
WKUE	b. R. L. Barnes ..	892	WNOE	b. Fort Riley ..	846
WKUI	b. Western Belle ..	926	WNOI	b. Fort Harrison ..	846
WKUO	b. Balino ..	820	WNOO	b. Fort Smelling ..	846
WKUO	b. Bolina ..	823	WNOU	b. Fort Russell ..	846
WKUU	b. West Zeda ..	928	WNUA	b. Anthera ..	817
WLAA	b. Sarcoxie ..	896	WNUE	b. Blakeley ..	823
WLAE	b. Barlow ..	821	WNUI	b. Bockonoff ..	823
WLAI	b. Lake Grandon ..	866	WNUO	b. Brookdale ..	825
WLAO	b. Govan ..	850	WNUU	b. Brookfield ..	821
WLAU	b. Lake Fluvanna ..	865	WPAA	b. Balsto ..	895
WLEA	b. Lake Farge ..	864	WPAA	b. Sag Harbor ..	931
WLEE	b. Lake Faristell ..	864	WPAI	b. Yomachichi ..	929
WLEI	b. Lake Forkville ..	865	WPAO	b. Wilscox ..	932
WLEO	b. Lake Cathoon ..	863	WPAU	b. Zudie ..	822
WLEU	b. Lake Fugard ..	865	WPEA	b. Belamquan ..	923
WLIA	b. S. Teresa ..	919	WPEE	b. Wachu ..	857
WLIE	b. Berwyn ..	823	WPEI	b. Istat ..	854
WLII	b. Goree ..	850	WPEO	b. Hiddenite ..	884
WLIO	b. Nantasket ..	878	WPEU	b. Pamaway ..	834
WLIU	b. Bologan ..	823	WPIA	b. Corilla ..	835
WLKZ	b. Montpelier ..	876	WPIE	b. Corrales ..	835
WLOA	b. Neecolah ..	879	WPII	b. Corsican WPII ..	865
WLOE	b. Nupolela ..	881	WPIO	b. Lake Fostoria ..	865
WLOI	b. Columbine WLOI ..	833	WPIU	b. Lake Fouché ..	893
WLOO	b. Cadaretta ..	827	WPOA	b. Roy H. Beattie ..	831
WLOU	b. Bark Hamstead ..	821	WPOE	b. Chibiabos ..	839
WLUA	b. Latoka ..	869	WPOI	b. Dungeness WPOI ..	924
WLUE	b. Haverhill ..	853	WPOO	b. Washtenaw ..	830
WLUI	b. Alamosa ..	815	WPOU	b. Charles M. Everest ..	825
WLUD	b. Alcona ..	816	WPUA	b. Brockhaven ..	827
WLUD	b. Ingold ..	856	WPUE	b. Caddopeak ..	827
WMAA	b. Lake Furley ..	865	WPUI	b. Callabahas ..	828
WMAE	b. Cowenshannock ..	835	WPUO	b. Cascade ..	833
WMAI	b. Cowboy ..	835	WPUU	b. Coaxet ..	879
WMAO	b. Cowee ..	835	WQAA	b. Nasket ..	815
WMEA	b. Costilla ..	835	WQAI	b. Agria ..	835
WMEE	b. Cote Blanche ..	835	WQAO	b. Coulter ..	854
WMEI	b. Cotopaxi ..	835	WQAU	b. Hoosac ..	870
WMEQ	b. Cottonplant ..	835	WQEA	b. Lithopolis ..	844
WMEU	b. Cottonwood ..	835	WQEE	b. Everglades ..	891
WMIA	b. Coconino ..	833	WQEI	b. Rebecca Palmer ..	928
WMIE	b. Polar Land ..	887	WQEO	b. West Zula ..	827
WMII	b. Kanabec ..	859	WQEU	b. Canibas ..	875
WMIO	b. Stadacona ..	903	WQIA	b. Mexoil ..	822
WMIU	b. Sir Trevor Dawson ..	899	WQIE	b. Bedminster ..	854
WMOA	b. Tillamook ..	920	WQII	b. Holbrook WQII ..	879
WMOE	b. Arvonja ..	819	WQIO	b. Neponset ..	917
WMOI	b. Braeburn ..	824	WQIU	b. Swampscott ..	920
WMOO	b. Owatama ..	884	WQOA	b. Tipton ..	848
WMOU	b. Klamath WMOU ..	861	WQOE	b. Garfield ..	920
WMUA	b. Wheaton ..	928	WQOI	b. Tolo ..	846
WMUE	b. Cokato ..	833	WQOO	b. Folsom ..	826
WMUI	b. Charlot ..	830	WQOU	b. Bugaya ..	833
WMUO	b. Panola ..	885	WQUA	b. Cokesit ..	842
WMUU	b. Aiken ..	815	WQUE	b. Edgecombe ..	846
WNAA	b. Craincreek ..	835	WQUI	b. Flavel ..	855
WNAE	b. Cranenest ..	835	WQUO	b. Iconium ..	

		PAGE			PAGE
WQUU	b. Jacona ..	857	WRAA	b. Basaan ..	821
WRAA	b. Amabala ..	816	WRAE	b. Allegheny WRAI ..	816
WRAI	b. Gut Heil ..	851	WRAO	b. West Lashaway ..	927
WREA	b. Wauconda ..	925	WREE	b. Quistconck ..	889
WREI	b. Zirkel ..	932	WREO	b. Aowa ..	817
WRIA	b. Lake Gorin ..	866	WRIE	b. Roman ..	892
WRII	b. Star I ..	903	WRIO	b. Quinneseco ..	889
WRIU	b. Westpool ..	928	WROA	b. Indianapolis ..	856
WROO	b. E. L. Doheny, III ..	870	WROE	b. Lydia WROI ..	850
WROU	b. Belgrade ..	843	WROO	b. E. L. Doheny, III ..	843
WRUA	b. Kangi ..	859	WROU	b. Governor John Lind ..	850
WRUE	b. Medford ..	874	WRUI	b. Okiya ..	882
WRUI	b. Quittcas ..	889	WRUO	b. Wakiki ..	923
WRUU	b. Dancey ..	837	WSAA	b. Apalachee ..	818
WSAE	b. Fairfield ..	845	WSAI	b. Alabat ..	815
WSAO	b. Bagose ..	820	WSAU	b. Defiance ..	837
WSAE	b. W. L. Steed ..	930	WSEA	b. Cricket ..	836
WSEI	b. Lake Fondulac ..	865	WSEO	b. Lake Buckeye ..	863
WSEU	b. Caribou ..	828	WSIA	b. Harish ..	852
WSIA	b. Casmailia ..	823	WSIE	b. Tyee WSIO ..	921
WSII	b. Euharlee ..	844	WSIU	b. Mount Rainier ..	875
WSIO	b. West Sequana ..	928	WSOA	b. Crathorne ..	835
WSIU	b. Lewiston ..	869	WSOE	b. West Helix ..	927
WSOA	b. West Wauna ..	928	WSOI	b. West Waunakee ..	928
WSOE	b. Yaklok ..	931	WSOO	b. Lake Gradan ..	866
WSOI	b. Lake Beacon ..	862	WSOU	b. Lake Desha ..	863
WSOU	b. Lake Mattato ..	867	WSUA	b. Lake Licoco ..	867
WSUA	b. Campello ..	827	WSUE	b. Canaveral ..	827
WSUE	b. Cedar Spring ..	827	WSUI	b. Ceralvo ..	829
WSUI	b. Cerosco ..	829	WSUO	b. Coperas ..	829
WSUO	b. Fernandina WTIA ..	834	WSUU	b. Mayport ..	845
WSUA	b. Socony 90 ..	873	WTAA	b. Socony 94 ..	899
WSUE	b. Deerfield ..	899	WTAE	b. Allison ..	837
WSUI	b. Amoron ..	816	WTAO	b. Belair ..	822
WSUO	b. Toiler ..	920	WTAT		

PAGE			PAGE
857	WTOU	b. Coulee	835
821	WTUA	b. Lake Grafton ..	866
817	WTUE	b. Laurel WTUE ..	869
816	WTUI	b. Calvert	827
851	WTUO	b. Houma	855
927	WTUU	b. West Mahomet ..	927
925	WVAA	b. Coquina	834
889	WVAE	b. Corapeak	834
932	WVAI	b. Corcoran	834
817	WVAO	b. Conotton	834
866	WVAU	b. Contoocook ..	834
892	WVEA	b. Congaree	834
903	WVEE	b. Alanthus	815
889	WVEI	b. Basco	821
928	WVEO	b. Banago	821
856	WVEU	b. Isanti	856
870	WVIA	b. Lake Gormanian ..	866
843	WVIE	b. Yamhill	931
822	WVII	b. Buhisan	826
859	WVIU	b. Lake Govan	866
850	WVOA	b. Council Bluffs ..	835
874	WVOE	b. Couparle	835
882	WVOI	b. Courtois	835
889	WVOO	b. Coushatta	835
923	WVOU	b. Coutolene	835
837	WVUA	b. Courageous	835
818	WVUE	b. J. B. Stetson ..	857
845	WVUI	b. Arado	818
815	WVUO	b. Aimwell	815
820	WVUU	b. Kanakee	859
837	WXAA	b. Ozaukee	884
930	WXAE	b. Yainax	931
836	WXAI	b. Cocopa	833
865	WXAO	b. Danebrog	837
863	WXAU	b. Keota	860
828	WXEE	b. Okesa	882
852	WXEI	b. Western Comet ..	926
829	WXEO	b. West Cape	925
921	WXEU	b. Yukon	931
844	WXFA	b. Western Scout ..	926
875	WXIA	b. Victorious	923
877	WXIE	b. Waneyanda	924
928	WXII	b. Wenakee	925
835	WXIO	b. Buckhorn	825
869	WXIU	b. Aberdeen WXIU ..	814
927	WXOA	b. Cowiche	835
928	WXOE	b. Crabtree	835
928	WXOI	b. Craigrownie	835
931	WXOO	b. Craigsmere	835
866	WXOU	b. Lake Calvenia ..	863
862	WXUA	b. Beaumont	822
863	WXUE	b. Boreta	824
867	WXUI	b. Hampden	852
867	WXUO	b. Monmouth WXUO ..	876
827	WXUU	b. Bayou Teche	821
827	WZAA	b. L. J. Drake	870
829	WZAE	b. West Humhaw	927
829	WZAI	b. Alapaha	815
829	WZAO	b. Botsford	824
834	WZAU	b. E. C. Pope	842
845	WZEA	b. Saxon WZEA	897
873	WZEE	b. Maruba	873
899	WZEI	b. G. A. Flagg	847
899	WZEO	b. Randolph S. Warner ..	891
837	WZEU	b. North Pines	881
816	WZIA	b. Darrah	837
817	WZIE	b. Burmont	826
822	WZII	b. Burnham	826
920	WZIO	b. Admiral Mayo	814

		PAGE			PAGE
WZIU	b. Western Plains ..	926	XEY	b. Kioto ..	769
WZOA	b. Lake Graphite ..	866	XEZ	b. Menevian ..	778
WZOE	b. Lake Gratis ..	866	XFA	b. Hocking ..	764
WZOI	b. Lake Graton ..	866	XFB	b. Alicia ..	727
WZOO	b. Lake Gravella ..	866	XFC	b. Mahsud ..	774
WZOU	b. Lake Gravett ..	866	XFD	b. Otira ..	785
WZUA	b. Norfolk ..	880	XFE	b. Bernini ..	734
WZUE	b. Newburgh ..	879	XFF	b. Ravens Point ..	792
WZUO	b. Marshall ..	872	XFG	b. Duke of Cornwall ..	751
WZUU	b. Oglathorpe ..	882	XFH	b. Penmount ..	786
X	c. Limon ..	542	XFI	b. Pendeen ..	786
Xi	c. Nuremberg ..	554	XFJ	b. Rounton ..	794
XA	b. Olinda ..	625	XFK	b. Addington ..	735
XB	b. Paloma ..	625	XFM	b. Burdale ..	737
XU	c. Cassel ..	553	XFO	b. Horseferry ..	764
XAA	c. Veracruz de Vera-cruz ..	567	XFP	b. Glint ..	759
XAB	c. Campeche ..	566	XFQ	b. Kaynes ..	769
XAC	c. Payo Obispo ..	566	XFR	b. Whitwood ..	812
XAD	c. Alamos de Sonora ..	566	XFU	b. Lady Wimborne ..	771
XAE	c. Mazatlán de Sinaloa ..	566	XFW	b. Glitra ..	759
XAF	c. La Paz de La Baja, California ..	566	XFW	b. Greldeale ..	761
XAG	c. S. Rosalia de la Baja, California ..	566	XXF	b. Mecklenburg XFX	777
XAH	c. Guaymas ..	566	XGZ	b. Notanda ..	783
XAI	c. Tuxpam de Veracruz ..	567	XGC	b. Dumra ..	751
XAJ	c. Tampico de Tamaulipas ..	566	XGE	b. Zaida ..	813
XAK	c. Acapulco de Guerrero ..	566	XGF	b. Zira ..	813
XAL	c. Puerto Lobos ..	566	XGG	b. Bulimba ..	737
XAM	c. Merida de Yucatan ..	566	XHB	b. Clan Macvicar ..	745
XAN	c. Salina Cruz ..	566	XHD	b. Mapleton ..	776
XBA	b. S. Bernardo ..	696	XHG	b. Edmonton ..	752
XBB	b. México XBB ..	696	XHH	b. Tintern Abbey ..	803
XBE	b. S. Antonio ..	696	XHI	b. Hotham Newton ..	764
XBF	b. Korrigan III ..	696	XHK	b. Boverton ..	735
XBH	b. Mazatlan ..	696	XHL	b. Grelrosa ..	761
XBI	b. S. Cristobal ..	696	XHM	b. Upminster ..	806
XBK	b. Jalisco ..	696	XHN	b. Relentless ..	792
XBL	b. Coahuila ..	696	XHO	b. Port Nicholson ..	789
XCA	b. General Zaragoza ..	696	XHP	b. Port Bowen ..	789
XCD	b. Lucknow ..	621	XHQ	b. Port Caroline ..	789
XCF	b. Progreso ..	696	XHS	b. Pollensa ..	788
XDA	c. Chapultepec ..	566	XHU	b. Sheridan ..	797
XEA	b. Wellpark ..	811	XHV	b. Sidlaw Range ..	797
XEB	b. Glenpark ..	759	XHX	b. Ryburn ..	795
XED	b. Ethelhilda ..	755	XHY	b. Rexmore ..	793
XEE	b. Capelpark ..	738	XHZ	b. Sweethope ..	800
XEF	b. Gulf of Suez ..	761	XIC	b. Andalusan ..	727
XEG	b. Boscombe Chine ..	735	XID	b. Norburn ..	782
XEI	b. Rouen XEI ..	794	XIE	b. Polycarp ..	788
XEJ	b. Kinsale ..	769	XIG	b. Firtree ..	756
XEK	b. Eric Calvert ..	754	XIH	b. Petworth ..	787
XEK	b. Silsden ..	798	XII	b. Serbino ..	797
XEL	b. Auldmuir ..	730	XIJ	b. Gileston ..	758
XEM	b. Treglissan ..	804	XIK	b. Deerwood ..	750
XEN	b. Victorian Transport ..	807	XIL	b. Muneric ..	780
XEO	b. Syndic ..	800	XIN	b. Bonny ..	735
XEP	b. City of Rheims ..	741	XIO	b. Glenshane ..	759
XEP	b. Ivanhoe ..	767	XIP	b. Ainsdale ..	726
XEQ	b. Gerent ..	758	XIR	b. Varzin ..	806
XES	b. Baron Ailsa ..	731	XIT	b. Menapian ..	777
XET	b. William Middleton ..	812	XIU	b. Menapian ..	760
XEU	b. Confield ..	747	XIV	b. Gothic Prince ..	798
XEV	b. Southern XEV ..	799	XIW	b. Slavic Prince ..	757
XEW	b. Sedgpool ..	797	XIX	b. Gaelic Prince ..	739
XEX	b. City of Corinth ..	741	XIY	b. Celtic Prince ..	728
			XIZ	b. Arabian Prince ..	787
			XJA	b. Persian Prince ..	750
			XJB	b. Denpark ..	762
			XJC	b. Hatimura ..	777
			XJD	b. Melmore Head ..	743
				b. Clan Macbean ..	743

		PAGE			PAGE
XJE	b. Clan Alpine ..	742	XJX	b. War Spray ..	738
XJF	b. Cid XJF ..	741	XKB	b. Tregonell ..	811
XJF	b. Dee ..	750	XKC	b. Treneglos ..	804
XJG	b. Kenilworth ..	760	XKD	b. Trevese ..	804
XJH	b. Henry Holmes ..	763	XKF	b. Glenapp ..	805
XJI	b. Rion ..	793	XKG	b. Lesto ..	758
XJJ	b. Kura ..	770	XKJ	b. Levensau ..	771
XJK	b. Cairnvalona ..	737	XKK	b. Peveril ..	771
XJL	b. Sydney Reid ..	800	XKN	b. Luga ..	787
XJM	b. Nilemede ..	766	XKO	b. Rancee ..	773
XJN	b. Islandia ..	774	XKP	b. Rajah ..	792
XJO	b. Maimyo ..	774	XKQ	b. Woodville ..	791
XJP	b. Malancha ..	774	XKV	b. Hans Hensoth ..	813
XJQ	b. Macharda ..	773	XKW	b. Clan Macmillan ..	762
XJU	b. Australier XJU	731	XKX	b. Valenore ..	745
XJW	b. Cape Natal ..	738	XKY	b. Westhope ..	806
XJX	b. War Spray ..	738	XKZ	b. Montezuma ..	811
XKB	b. Tregonell ..	811	XLC	b. Castellano ..	779
XKC	b. Treneglos ..	804	XLD	b. Horn Shell ..	739
XKD	b. Trevese ..	804	XLG	b. Oakwin ..	764
XKF	b. Glenapp ..	805	XLH	b. Bradavon ..	783
XKG	b. Lesto ..	758	XLK	b. Argalia ..	735
XKJ	b. Levensau ..	771	XLN	b. Trevean ..	729
XKK	b. Peveril ..	771	XLM	b. Mount Everest ..	805
XKN	b. Luga ..	787	XLN	b. Baron Blantyre ..	780
XKO	b. Rancee ..	773	XLP	b. Warina ..	731
XKP	b. Rajah ..	792	XLO	b. Tibermede ..	809
XKQ	b. Woodville ..	791	XLS	b. Trojan Prince ..	803
XKV	b. Hans Hensoth ..	813	XLY	b. Tewkesbury ..	805
XKW	b. Clan Macmillan ..	762	XLZ	b. Relillio ..	803
XKX	b. Valenore ..	745	XMA	b. Woodburn ..	793
XKY	b. Westhope ..	806	XMB	b. Lorina ..	812
XKZ	b. Montezuma ..	811	XMC	b. Redruth ..	772
XLC	b. Castellano ..	779	XMK	b. War Begum ..	792
XLD	b. Horn Shell ..	739	XML	b. War Nawab ..	808
XLG	b. Oakwin ..	764	XMN	b. War Diwan ..	809
XLH	b. Bradavon ..	783	XMP	b. War Gaekwar ..	809
XLK	b. Argalia ..	735	XMR	b. Cape of Good Hope ..	809
XLN	b. Trevean ..	729	XMT	b. Atlenten ..	738
XLM	b. Mount Everest ..	805	XMU	b. Sheaf Lance ..	730
XLN	b. Baron Blantyre ..	780	XMV	b. Rajput ..	797
XLP	b. Warina ..	731	XMY	b. Roquelle ..	791
XLO	b. Tibermede ..	809	XMZ	b. Ardgowan ..	794
XLS	b. Trojan Prince ..	803	XNB	b. Tullamore ..	729
XLY	b. Tewkesbury ..	805	XNC	b. Yung-Tsh ..	805
XLZ	b. Relillio ..	803	XNF	b. Yung-Fung ..	825
XMA	b. Woodburn ..	793	XNG	b. Yung-Chion ..	825
XMB	b. Lorina ..	812	XNL	b. Foo-An ..	825
XMC	b. Redruth ..	772	XNO	b. Yu-Chang ..	824
XMK	b. War Begum ..	792	XNP	b. Canton ..	825
XML	b. War Nawab ..	808	XNS	b. Nan-Shen ..	825
XMN	b. War Diwan ..	809	XNW	b. Chao-Ho ..	824
XMP	b. War Gaekwar ..	809			
XMR	b. Cape of Good Hope ..	809			
XMT	b. Atlenten ..	738			
XMU	b. Sheaf Lance ..	730			
XMV	b. Rajput ..	797			
XMY	b. Roquelle ..	791			
XMZ	b. Ardgowan ..	794			
XNB	b. Tullamore ..	729			
XNC	b. Yung-Tsh ..	805			
XNF	b. Yung-Fung ..	825			
XNG	b. Yung-Chion ..	825			
XNL	b. Foo-An ..	825			
XNO	b. Yu-Chang ..	824			
XNP	b. Canton ..	825			
XNS	b. Nan-Shen ..	825			
XNW	b. Chao-Ho ..	824			

PAGE			PAGE
742	XNY	b. Yung-Kien ..	625
741	XOA	b. Chu-Tai ..	624
750	XOC	c. Wuchang ..	540
769	XOD	b. Chu-Tung ..	624
763	XOG	b. Chu-Kwan ..	624
793	XON	b. Chu-Chien ..	624
770	XOU	b. Chu-Yu ..	624
737	XOW	c. Foochow ..	540
800	XOY	b. Chu-Yew ..	624
782	XPF	b. Tung-Chi ..	625
766	XPB	c. Peking XPK	540
774	XPN	b. Kien-An ..	625
774	XPO	b. Kien-Kong ..	625
773	XPS	b. Fei-Ying ..	624
731	XPW	b. Kien-Wei ..	625
738	XQC	b. Kiang-Chien ..	624
811	XQH	b. Kiang-Han ..	624
804	XQL	c. Kalgan ..	540
804	XQR	b. Kiang-Li ..	624
805	XQU	b. Kiang-Yuen ..	624
758	XQW	b. King-Ching ..	625
771	XRC	b. Lien-Chin ..	625
771	XSC	b. Hai-Chi ..	624
787	XSF	b. Ying-Swei ..	625
773	XSG	c. Woosung, Kiangsu	540
792	XSH	c. Shanghai ..	540
791	XSP	b. Hai-Shen ..	624
813	XSU	c. Tsungming ..	540
762	XSW	b. Hai-Chew ..	624
745	XSX	b. Hai-Yung ..	624
806	XTI	b. Lord Ormond ..	621
811	XTK	b. Bahadur ..	731
779	XTO	b. Beaverton ..	733
739	XTV	b. Kursk ..	770
764	XUC	b. Krasnoïarsk XUC	770
783	XUF	b. Sumatra XUF	800
735	XUI	b. Treinta-y-Tres ..	804
729	XUJ	b. Tremeadow ..	804
805	XUK	b. Polshannon ..	788
780	XUN	b. Alaska ..	726
731	XVA	b. Canadian Warrior ..	620
809	XVB	b. Glenorchy ..	621
803	XVE	b. Quebec ..	622
805	XVF	b. Canadian Ranger ..	620
803	XVG	b. War Hamilton ..	623
793	XVK	b. Canadian Recruit ..	620
812	XVL	b. Mariska ..	621
772	XVM	b. Canadian Volunteer	620
792	XVO	b. War Convoy ..	623
808	XVP	b. Canadian Trader ..	620
809	XVR	b. Canadian Sailor ..	620
809	XVS	b. Canadian Signaller ..	620
809	XVT	b. Turner (General) ..	623
738	XVV	b. Sable I ..	623
730	XVW	b. War Hydra ..	623
797	XVX	b. Turret Crown ..	623
791	XVY	b. Eronterac ..	621
794	XVY	b. Frontenac ..	757
729	XVZ	b. Canadian Miller ..	620
805	XWB	b. Iver Heath ..	767
625	XWC	b. General William ..	758
625	XWD	b. Canadian Adventurer	620
625	XXB	b. War Earl ..	809
625	XXC	b. Samnanger ..	795
624	XXD	b. Warla ..	809
625	XXE	b. Baldina ..	731
540	XXG	b. War Sumas ..	811
625	XXK	b. War Gaspe ..	809
624	XXL	b. War Matane ..	809

		PAGE			PAGE
XXM	b. War Ottawa ..	810	YCO	b. Bokana ..	735
XXN	b. War Niagara ..	809	YCR	b. South Pacific ..	799
XXO	b. Cape Premier ..	738	YCS	b. Tunstall ..	805
XXQ	b. War Nicola ..	810	YCT	b. Lochiel ..	772
XXR	b. War Witch ..	811	YCU	b. Levnet ..	771
XXT	b. War Taurus ..	811	YCV	b. Spectator ..	799
XXY	b. Harald Casper ..	762	YCW	b. Bayramento ..	733
XYA	b. War Casco ..	808	YCX	b. Caithness ..	737
XYG	b. War Suquash ..	811	YCX	b. Ramsay ..	792
XYH	b. War Chilkat ..	809	YCY	b. Huntball ..	765
XYI	b. War Chariot ..	809	Y CZ	b. Boutry ..	735
XYJ	b. War Fiend ..	809	YDB	b. Carlow Castle ..	739
XYN	b. War Karma ..	809	YDC	b. Bereby ..	734
XYP	b. War Racoon ..	810	YDD	b. Earlswood ..	752
XYQ	b. War Tanoo ..	811	YDE	b. Anchoria ..	727
YXS	b. War Halton ..	809	YDF	b. Glensloy ..	759
XYT	b. War Algoma ..	808	YDG	b. Aro ..	729
XYU	b. War Magic ..	809	YDH	b. Rheinfels ..	793
XYX	b. War Fury ..	809	YDI	b. Rossia YDI ..	794
YN	c. Lyons ..	549	YDJ	b. Lodorer ..	772
YAA	b. Argonauta ..	729	YDK	b. Roisheim YDK ..	793
YAC	b. Bogota ..	735	YDL	b. Albatross ..	726
YAD	b. Dromore Castle ..	751	YDM	b. Chertsey ..	740
YAE	b. Beechwood ..	733	YDO	b. Nantwen ..	781
YAF	b. Saba ..	795	YDP	b. Crane ..	748
YAG	b. Anglier ..	727	YDR	b. Pontwen ..	769
YAM	b. Laristan ..	771	YDT	b. Kingsbury ..	772
YAN	b. Bratton Castle ..	735	YDW	b. Lingfield ..	772
YAO	b. Bayersher ..	733	YDX	b. Frankburn ..	756
YAQ	b. Dunaff Head ..	749	YDY	b. Lord Downshire ..	772
YAR	b. Harlow ..	762	YDZ	b. Bellfield ..	733
YAT	b. Ravenshoe ..	792	YEA	b. Sunik ..	800
YAU	b. Homefield ..	764	YEB	b. Batanga ..	732
YAV	b. Arachne ..	729	YEC	b. Badagry ..	731
YAX	b. Dundrum Castle ..	752	YED	b. Holywell ..	764
YAY	b. Grindon Hall ..	761	YEF	b. Barracoo ..	731
YBA	b. Waltham ..	808	YEG	b. Helmsdale ..	763
YBB	b. Kaiping ..	767	YEH	b. Marie Rose YEH ..	776
YBC	b. Nizam ..	782	YEK	b. Baron Minton ..	732
YBE	b. Maskinonge ..	777	YEL	b. S. Dunstan ..	801
YBF	b. Bampton Castle ..	731	YEM	b. Bendoran ..	733
YBG	b. Astrakhan YBG ..	730	YEN	b. Huntshead ..	765
YBH	b. Queen Helena ..	791	YEO	b. Eastlands ..	752
YBL	b. Gray ..	760	YEP	b. Glenmorag ..	759
YBM	b. Warawala ..	808	YEQ	b. Seatwell ..	796
YBO	b. Normandier ..	782	YER	b. Scatwell ..	758
YBR	b. Yildum YBR ..	813	YES	b. Gladiator ..	743
YBS	b. Jolly Helen ..	767	YET	b. Clan Kenneth ..	759
YBT	b. Kamenetz Podolsk ..	768	YEW	b. Golden Eagle ..	736
YBU	b. Warepa ..	809	YEX	b. Breconian ..	813
YBV	b. Teuto ..	803	YFY	b. Zimorodok ..	773
YBW	b. Porsanger ..	789	YFA	b. Lydia ..	787
YCA	b. Benwood ..	734	YFB	b. Pecton ..	808
YCB	b. Roselands ..	794	YFC	b. War Breaker ..	773
YCC	b. Fantee ..	755	YFD	b. Lumina ..	765
YCD	b. Thurland Castle ..	803	YFG	b. Imber ..	729
YCE	b. Ardenhall ..	729	YFH	b. Ariano ..	737
YCF	b. Balfra ..	734	YFI	b. Cabotia ..	730
YCH	b. Courtfield ..	748	YFJ	b. Aungban ..	764
YCI	b. Trevanion ..	805	YFK	b. Hopelyn ..	756
YCJ	b. Monkshaven ..	779	YFL	b. Fernley ..	780
YCK	b. Loyal Citizen ..	773	YFM	b. Mottisfont ..	786
YCK	b. Marchioness ..	773	YFN	b. Penare ..	766
YCL	b. of Bute ..	776	YFO	b. Innerton ..	771
YCM	b. Sizergh Castle ..	798	YFP	b. Linerton ..	797
YCO	b. Edith Cavell YCM ..	752	YFP	b. Sheafmead ..	762
YCP	b. Bodnant ..	735	YFR	b. Hawsker ..	761
YCP	b. Willaston ..	812	YFS	b. Grelben ..	761
			YFT	b. Grelarlie ..	753
				b. Elder Branch ..	753

		PAGE			PAGE
YFV	b. Lord Rhondda ..	772	YJH	b. Lord Rhondda ..	772
YFW	b. Albistan ..	726	YJI	b. Albistan ..	726
YFY	b. War Zephyr ..	811	YJJ	b. War Zephyr ..	811
YFZ	b. Fastness ..	755	YJK	b. Fastness ..	755
YGA	b. Mokta ..	779	YJL	b. Mokta ..	779
YGB	b. Boukadra ..	735	YJM	b. Boukadra ..	735
YGC	b. Huddersfield ..	764	YJN	b. Huddersfield ..	764
YGD	b. Stellina ..	799	YJO	b. Stellina ..	799
YGE	b. Franktor ..	757	YJP	b. Franktor ..	757
YGF	b. Roseden ..	794	YJQ	b. Roseden ..	794
YGG	b. Clan Macbeolan ..	743	YJR	b. Clan Macbeolan ..	743
YGH	b. Trevaylor ..	805	YJS	b. Trevaylor ..	805
YGI	b. Alpine Range ..	727	YJT	b. Alpine Range ..	727
YGJ	b. Clearton ..	747	YJU	b. Clearton ..	747
YGL	b. Chingford ..	740	YJV	b. Chingford ..	740
YGM	b. Teespool ..	802	YJW	b. Teespool ..	802
YGN	b. Port Darwin ..	789	YJX	b. Port Darwin ..	789
YGP	b. Tenterden ..	803	YJY	b. Tenterden ..	803
YGO	b. Paul Paix ..	786	YJZ	b. Paul Paix ..	786
YGR	b. Whimbrel ..	811	YKA	b. Whimbrel ..	811
YGS	b. Irish Monarch ..	766	YKB	b. Irish Monarch ..	766
YGU	b. Magdala ..	773	YKC	b. Magdala ..	773
YGV	b. Ladykirk ..	770	YKD	b. Ladykirk ..	770
YGW	b. Peterton ..	787	YKE	b. Peterton ..	787
YGX	b. Tiberton ..	803	YKF	b. Tiberton ..	803
YGX	b. Achlibster ..	725	YKG	b. Achlibster ..	725
YGY	b. Glofield ..	759	YKH	b. Glofield ..	759
YGZ	b. Ravelston ..	792	YKI	b. Ravelston ..	792
YHA	b. Eastern City ..	752	YKJ	b. Eastern City ..	752
YHB	b. Haleric ..	761	YKK	b. Haleric ..	761
YHC	b. Pendarves ..	786	YKL	b. Pendarves ..	786
YHF	b. Helredale ..	763	YKM	b. Helredale ..	763
YHG	b. Frankier ..	756	YKN	b. Frankier ..	756
YHH	b. Morinier ..	779	YKO	b. Morinier ..	779
YHI	b. Luceric ..	773	YKP	b. Luceric ..	773
YHL	b. Mantilla ..	775	YKQ	b. Mantilla ..	775
YHN	b. Adra ..	726	YKR	b. Adra ..	726
YHO	b. Alaveño ..	726	YKS	b. Alaveño ..	726
YHP	b. Electrician ..	753	YKT	b. Electrician ..	753
YHQ	b. Baymingo ..	733	YKU	b. Baymingo ..	733
YHR	b. Redbridge ..	792	YKV	b. Redbridge ..	792
YHS	b. Cornish City ..	748	YKW	b. Cornish City ..	748
YHT	b. Lancashire ..	771	YKY	b. Lancashire ..	771
YHV	b. Clintonia ..	747	YLA	b. Clintonia ..	747
YHW	b. Marie Therese ..	776	YLB	b. Marie Therese ..	776
YHX	b. Rhio ..	793	YLC	b. Rhio ..	793
YHY	b. Baymano ..	733	YLD	b. Baymano ..	733
YHZ	b. Slav ..	798	YLE	b. Slav ..	798
YIB	b. Clam ..	742	YLF	b. Clam ..	742
YID	b. Venetian ..	807	YLH	b. Venetian ..	807
YIE	b. Arranmoor ..	729	YLI	b. Arranmoor ..	729
YIF	b. Castlemoor ..	739	YLJ	b. Castlemoor ..	739
YIH	b. Dalemoor ..	749	YLK	b. Dalemoor ..	749
YII	b. Broompark ..	737	YLM	b. Broompark ..	737
YIJ	b. Inchmoor ..	762	YLN	b. Inchmoor ..	762
YIK	b. Lowmoor ..	766	YLO	b. Lowmoor ..	766
YIL	b. Orangemoor ..	772	YLP	b. Orangemoor ..	772
YIM	b. Pearmoor ..	784	YLQ	b. Pearmoor ..	784
YIR	b. Zurichmoor ..	786	YLR	b. Zurichmoor ..	786
YIS	b. Trelawny ..	813	YLS	b. Trelawny ..	813
YIU	b. Ethelstan ..	804	YLT	b. Ethelstan ..	804
YIV	b. Salacia ..	755	YLU	b. Salacia ..	755
YIW	b. Trevilly ..	795	YLV	b. Trevilly ..	795
YIX	b. Finchley ..	805	YLY	b. Finchley ..	805
YIY	b. Daghlid YIY ..	756	YMA	b. Daghlid YIY ..	756
YJZ	b. S. Michael ..	749	YMB	b. S. Michael ..	749
	b. Black Prince ..	801	YMC	b. Black Prince ..	801
					735

		PAGE			PAGE
YFV	b. Lord Rhondda ..	772	YJC	b. Abaris ..	725
YFW	b. Albistan ..	726	YJD	b. Chinese Prince ..	740
YFY	b. War Zephyr ..	811	YJE	b. British General ..	736
YFZ	b. Fastness ..	755	YJG	b. Tuscan Prince ..	805
YGA	b. Mokta ..	779	YJH	b. Mexican Prince ..	778
YGB	b. Boukadra ..	735	YJI	b. Royal Prince ..	794
YGC	b. Huddersfield ..	764	YJJ	b. British Marshall ..	736
YGC	b. Stellina ..	799	YJK	b. Tudor Prince ..	805
YGD	b. Franktor ..	757	YJL	b. Maindy Dene ..	774
YGE	b. Roseden ..	794	YJM	b. War Peridot ..	810
YGF	b. Clan Macbeolan ..	743	YJN	b. Author ..	731
YGG	b. Trevalyor ..	805	YJO	b. Clan Maclaren ..	744
YGH	b. Alpine Range ..	727	YJP	b. Clan Sutherland ..	746
YGI	b. Clearton ..	747	YJQ	b. Clan Macaulay ..	743
YGJ	b. Chingford ..	740	YJR	b. Domira ..	751
YGL	b. Teespool ..	802	YJS	b. Benlawers ..	734
YGM	b. Port Darwin ..	789	YJT	b. Alberta YJT ..	726
YGN	b. Pot Denison ..	789	YJV	b. H. M. Pellatt ..	761
YGN	b. Tenterden ..	803	YJW	b. Mirita YJW ..	779
YGP	b. Paul Paix ..	786	YJX	b. Suram ..	800
YGO	b. Whimbrel ..	811	YJY	b. Montana ..	779
YGR	b. Irish Monarch ..	766	YKA	b. Curaca ..	749
YGS	b. Magdala ..	773	YKC	b. Tweeddale ..	805
YGU	b. Ladykirk ..	770	YKE	b. Enfield ..	754
YGV	b. Peterton ..	787	YKG	b. Eskbridge ..	754
YGW	b. Tiberton ..	803	YKH	b. Alston ..	727
YGX	b. Achlibster ..	725	YKI	b. Hounslow ..	764
YGX	b. Glofield ..	759	YKK	b. Stork ..	799
YGY	b. Ravelston ..	792	YKL	b. Ilford ..	765
YGZ	b. Eastern City ..	752	YKO	b. Fennia ..	755
YHA	b. Haleric ..	761	YKP	b. Romney YKP ..	793
YHB	b. Pendarves ..	786	YKQ	b. Putney ..	791
YHC	b. Helredale ..	763	YKR	b. Ferngarth ..	756
YHF	b. Frankier ..	756	YKT	b. S. Patrick YKT ..	801
YHG	b. Morinier ..	779	YKV	b. Karnak ..	768
YHH	b. Luceric ..	773	YKW	b. Penrhoss ..	787
YHJ	b. Mantilla ..	775	YKW	b. Penylan ..	787
YHL	b. Adra ..	726	YKX	b. Bembridge ..	733
YHN	b. Alaveño ..	726	YKX	b. War Anchusa ..	808
YHO	b. Electrician ..	753	YKZ	b. Sikh ..	797
YHP	b. Baymingo ..	733	YLB	b. Oweenee ..	785
YHQ	b. Redbridge ..	792	YLC	b. Noelle ..	782
YHR	b. Cornish City ..	748	YLD	b. Darnholme ..	749
YHS	b. Lancashire ..	771	YLE	b. Watsness ..	811
YHT	b. Clintonia ..	747	YLF	b. Kut ..	770
YHV	b. Marie Therese ..	776	YLG	b. Gregory ..	761
YHW	b. Rhio ..	793	YLH	b. War Radnor ..	810
YHX	b. Baymano ..	733	YLI	b. Lanuvium ..	771
YHY	b. Slav ..	798	YLJ	b. Atlantic YLJ ..	730
YHZ	b. Clam ..	742	YLK	b. Khartum ..	769
YIB	b. Venetian ..	807	YLL	b. Daghestan ..	749
YID	b. Arranmoor ..	729	YLM	b. Yarborough ..	813
YIE	b. Castlemoor ..	739	YLN	b. Livingstonia ..	772
YIF	b. Dalemoor ..	749	YLP	b. Purfleet Belle ..	791
YIH	b. Broompark ..	737	YLT	b. Benarty ..	733
YII	b. Hazelmoor ..	762	YLU	b. Benledi ..	734
YIJ	b. Inchmoor ..	766	YLV	b. Pikepool ..	787
YIK	b. Lowmoor ..	772	YLW	b. Marshal Haig ..	776
YIL	b. Orangemoor ..	784	YLX	b. Germanic ..	758
YIM	b. Pearlmoor ..	786	YLY	b. Pengelly ..	786
YIR	b. Zurichmoor ..	813	YLY	b. Flaminian ..	756
YIS	b. Trelawny ..	804	YLZ	b. Methven ..	778
YIU	b. Ethelstan ..	755	YMA	b. Clifftower ..	747
YIV	b. Salacia ..	795	YMC	b. Jedmoor ..	767
YIW	b. Trevelley ..	805	YMD	b. Kelsomoor ..	769
YIX	b. Finchley ..	756	YME	b. Abonema ..	725
YIY	b. Daghild YIY ..	749	YMF	b. Nembe ..	781
YIZ	b. S. Michael ..	801	YMG	b. Palma YMG ..	785
YJB	b. Black Prince ..	735	YMI	b. Warri ..	810

YMJ	b. Boulama ..	735
YMK	b. Ancobra ..	727
YMM	b. Egwanga ..	753
YMO	b. Kemmel ..	769
YMP	b. Cedar Branch ..	739
YMQ	b. Marylebone ..	777
YMT	b. Amasis ..	727
YMT	b. Glenraza ..	759
YMV	b. Ernaston ..	754
YMX	b. Nivose ..	782
YMW	b. Aureole ..	731
YMX	b. Riverdale ..	793
YMY	b. Modesta ..	779
YMZ	b. Pensilva ..	787
YNA	b. Woodfield ..	812
YNB	b. Orator ..	784
YNC	b. Biela ..	734
YND	b. Ardoyne ..	729
YNE	b. Mortlake ..	780
YNF	b. Camillo ..	738
YNK	b. Mount Etna ..	780
YNL	b. Wabana ..	807
YNO	b. City of Versailles ..	742
YNO	b. Gledhow ..	758
YNS	b. Elm Branch ..	753
YNT	b. Othello ..	785
YNU	b. Glenorchy ..	759
YNW	b. Baysarnia ..	733
YNY	b. Boveric ..	735
YOA	b. Mentor ..	778
YOG	b. Clan Mackinnon ..	744
YOH	b. Clan Cumming ..	742
YOJ	b. Stentor ..	799
YOL	b. Mackinaw ..	773
YOM	b. Mahopac ..	774
YON	b. Clan Lamont ..	743
YOO	b. Clan Lindsay ..	743
YOP	b. Wye Tempest ..	813
YOR	b. Cavour ..	739
YOS	b. Strabo ..	799
YOT	b. Phidias ..	787
YOV	b. Ningchow ..	782
YOW	b. Deucalion ..	750
YOX	b. Teesbridge ..	802
YOY	b. Pyrrhus ..	791
YOZ	b. Lycaon ..	773
YPE	b. Oyleric ..	785
YPF	b. Poplar Branch ..	788
YPG	b. Novian ..	783
YPH	b. Line Branch ..	771
YPJ	b. Hambleton Range ..	761
YPK	b. Crenella ..	748
YPL	b. Justin ..	767
YPM	b. S. Margaret of Scotland ..	801
YPN	b. Grinton ..	760
YPO	b. Peleus ..	786
YPP	b. Teenkai ..	802
YPR	b. Cuthbert ..	749
YPS	b. Clan Macbrayne ..	743
YPT	b. Valdura ..	806
YPW	b. Portrushton ..	790
YPX	b. Arbroath ..	729
YPZ	b. Hindoo ..	763
YQA	b. Bassano ..	732
YQC	b. Archimedes ..	729
YQH	b. Portsea ..	790
YQJ	b. Competitor ..	747
YQK	b. Maresfield ..	776

YQL	b. Norman Monarch ..	782
YQR	b. War Sikh ..	810
YQU	b. Eurydamas ..	755
YQV	b. Hyltonia ..	765
YQW	b. S. Margherita ..	801
YQX	b. Admiral Coghane ..	725
YQZ	b. Eurymachus ..	753
YRA	b. Eurymedon ..	753
YRB	b. Bradclyde ..	735
YRC	b. Lord Kelvin ..	772
YRD	b. Amarna ..	727
YRE	b. Tarantia ..	802
YRG	b. Euryades ..	755
YRH	b. Eurybates ..	753
YRI	b. Eurylochus ..	753
YRJ	b. Eurypylus ..	753
YRM	b. Tarbert ..	802
YRN	b. Grecian Prince ..	761
YRO	b. Huntsgreen ..	765
YRP	b. Calomie YRP ..	737
YRR	b. Huntsgulf ..	765
YRS	b. Korean Prince ..	770
YRT	b. Glendevon ..	758
YRV	b. Campfield ..	738
YRW	b. King Edward YRW ..	769
YRX	b. Trevince ..	805
YRY	b. Prinses Juliana ..	791
YRZ	b. Huntsend ..	765
YSC	b. Brodhurst ..	757
YSD	b. Nitonian ..	782
YSE	b. Melville ..	777
YSG	b. Ramore Head ..	791
YSI	b. Jamaica ..	767
YSK	b. Camito ..	738
YSL	b. Alconda ..	727
YSM	b. City of Canton ..	741
YSN	b. Australia YSN ..	731
YSO	b. Canastota ..	738
YSP	b. Cranley ..	748
YST	b. Karapara ..	768
YSV	b. War Mohawk ..	809
YSY	b. Colonial ..	747
YSZ	b. Polyphemus ..	788
YTA	b. Prometheus ..	791
YTB	b. City of Oran ..	741
YTC	b. Matador ..	777
YTD	b. Mumbles Light ..	780
YTD	b. War Damson ..	809
YTE	b. Defender ..	750
YTF	b. War Huron ..	809
YTH	b. Murillo ..	780
YTI	b. Clan Mackay ..	744
YTI	b. Huntscraft ..	765
YTJ	b. Mandala ..	775
YTM	b. Mercuria ..	778
YTN	b. Orestes ..	784
YTO	b. Priam ..	790
YTR	b. Servian Prince ..	797
YTS	b. Hendon ..	763
YTT	b. Mattawa ..	777
YUH	b. Eastern ..	752
YUI	b. Empire YUI ..	754
YUK	b. City of Sparta ..	741
YUL	b. Clan Graham ..	742
YUM	b. Anglo-Egyptian ..	727
YUF	b. Hermeline ..	667
YUS	b. Waimarino ..	668
YUS	b. Waimarino ..	808

YUU	b. War Admiral ..	808
YUX	b. Jebba ..	782
YUY	b. Hatkhola ..	767
YUY	b. Natkhola ..	762
YUZ	b. Hatarana ..	781
YVA	b. Ardgool ..	762
YVB	b. Lobo (El) ..	729
YVC	b. War Swan ..	753
YVD	b. Clutha ..	811
YVE	b. Hurona ..	747
YVF	b. Huntress ..	765
YVH	b. Egori ..	765
YVI	b. Romera ..	753
YVJ	b. Namsang ..	793
YVK	b. Shadwell ..	781
YVL	b. Ellerdale ..	797
YVN	b. County of Car-	753
YVO	marthen ..	748
YVR	b. Cairndhu ..	737
YVS	b. Brodholme ..	737
YVT	b. Brodlife ..	737
YVU	b. Mercian ..	737
YVW	b. Clan Macbeth ..	778
YVY	b. Brodlea ..	743
YVZ	b. Clan Buchanan ..	737
YWB	b. Rostrevor ..	742
YWC	b. Slieve Bawn ..	794
YWE	b. Slieve Gallion ..	798
YWF	b. Slievemore ..	798
YWG	b. Snowdon ..	798
YWH	b. South Stack ..	798
YWI	b. Duke of Connaught ..	799
YWJ	b. Duke of Cumberland ..	751
YWK	b. Duke of Argyll ..	751
YWL	b. Duke of Clarence ..	751
YWM	b. Colleen Bawn ..	747
YWN	b. Mellifont ..	777
YWO	b. Mongolian Prince ..	779
YWP	b. Thorpe Grange ..	779
YWR	b. Berrima ..	803
YWS	b. Scarlet Tower ..	734
YWT	b. Kumara ..	796
YWX	b. Rose Castle ..	770
YXA	b. Wisley ..	794
YXB	b. War Seneca ..	812
YXC	b. Eastcliffe ..	810
YXE	b. Clan Mackinlay ..	752
YXF	b. Llangollen ..	744
YXG	b. Fanad Head ..	772
YXI	b. Monette ..	755
YXJ	b. Haslemere ..	779
YXK	b. Eggesford ..	762
YXL	b. Baluchistan ..	753
YXM	b. Hartmore ..	765
YXN	b. Panayots ..	731
YXO	b. Rio Bianco ..	785
YXR	b. Ballybunion ..	793
YXS	b. Princess Maud ..	586
YXT	b. Vardulia ..	791
YXV	b. Penolver ..	806
YXX	b. Scottish Prince ..	787
YXZ	b. Clan Mackenzie ..	796
YYA	b. Grellant ..	744
YYB	b. Singapore ..	761
YYC	b. Manchester ..	798
YYD	poration ..	Cor-
YYE	b. Anglo-Mexican ..	775
	b. Medway ..	727
	b. Lapland YYE ..	777
		771

		PAGE		PAGE	
YUU	b. War Admiral ..	808	YYF	b. Northland ..	783
YUX	b. Jebba ..	767	YYG	b. Malabar ..	774
YUY	b. Hatkhola ..	762	YYJ	b. Bassa ..	732
YUY	b. Natkhola ..	781	YYK	b. Moorish Prince ..	779
YUZ	b. Hatarana ..	762	YYL	b. Kashgar ..	768
YVA	b. Ardgoil ..	729	YYM	b. Vellavia ..	807
YVB	b. Lobo (El) ..	753	YYN	b. Siamese Prince ..	797
YVC	b. War Swan ..	811	YYO	b. Largo ..	771
YVD	b. Clutha ..	747	YYP	b. Chiverstone ..	741
YVE	b. Hurona ..	765	YYQ	b. City of Florence ..	741
YVF	b. Huntress ..	765	YYR	b. Ursus ..	806
YVH	b. Egori ..	753	YYT	b. Orthia ..	785
YVI	b. Romera ..	793	YYU	b. City of Newcastle ..	741
YVJ	b. Namsang ..	781	YYV	b. City of Cairo ..	741
YVK	b. Shadwell ..	797	YYW	b. Knowsley Hall ..	769
YVL	b. Ellerdale ..	753	YYX	b. Erinier ..	754
YVN	b. County of Car-		YYZ	b. Cherry Branch ..	740
	marthen ..	743	YZA	b. Clan Colquhoun ..	742
YVO	b. Cairndhu ..	737	YZB	b. Clan Sinclair ..	746
YVR	b. Brodholme ..	737	YZC	b. Glenshiel ..	759
YVS	b. Brodliffe ..	737	YZG	b. Clan Urquhart ..	747
YVT	b. Mercian ..	778	YZH	b. Alexandra YZH ..	727
YVV	b. Clan Macbeth ..	743	YZI	b. Manica ..	775
YVY	b. Brodlea ..	737	YZJ	b. Warialda ..	809
YVZ	b. Clan Buchanan ..	742	YZK	b. Almanzora ..	727
YWB	b. Rosstrevor ..	794	YZL	b. Weehawken ..	811
YWC	b. Slieve Bawn ..	798	YZM	b. Huronian ..	765
YWE	b. Slieve Gallion ..	798	YZN	b. Kashmir ..	768
YWF	b. Slievemore ..	798	YZO	b. Kalyan ..	768
YWG	b. Snowdon ..	798	YZP	b. Aras ..	729
YWH	b. South Stack ..	799	YZQ	b. Metagama ..	778
YWI	b. Duke of Connaught ..	751	YZS	b. Clan MacArthur ..	743
YWJ	b. Duke of Cumberland ..	751	YZT	b. Egremont Castle ..	753
YWK	b. Duke of Argyll ..	751	YZV	b. Great Southern ..	760
YWL	b. Duke of Clarence ..	751	YZW	b. Great Western ..	760
YWM	b. Colleen Bawn ..	747	YZY	b. Waterford ..	811
YWN	b. Mellifont ..	777	ZAB	b. Glenspean ..	759
YWO	b. Mongolian Prince ..	779	ZAD	b. Frankmere ..	757
YWP	b. Thorpe Grange ..	803	ZAE	b. Royal Transport ..	795
YWR	b. Berrima ..	734	ZAF	b. Policastria ..	788
YWS	b. Scarlet Tower ..	796	ZAG	b. Thespis ..	803
YWT	b. Kumara ..	770	ZAI	b. Telemachus ..	803
YWV	b. Rose Castle ..	794	ZAK	b. Mombassa ..	779
YWX	b. Wisley ..	812	ZAN	b. Chepstow Castle ..	740
YXA	b. War Seneca ..	810	ZAP	b. Winnebago ..	812
YXB	b. Eastcliffe ..	752	ZAR	b. Rathlin Head ..	792
YXC	b. Clan Mackinlay ..	744	ZAT	b. Hornsey ..	764
YXE	b. Llangollen ..	772	ZAV	b. Anamba ..	727
YXF	b. Fanad Head ..	755	ZAW	b. Cyrena ..	749
YXG	b. Monette ..	779	ZAX	b. Muncaster Castle ..	780
YXI	b. Haslemere ..	762	ZAY	b. Lexington ..	771
YXJ	b. Eggesford ..	753	ZAZ	b. Abadesa ..	725
YXK	b. Baluchistan ..	731	ZBA	b. Lepanto ZBA ..	771
YXL	b. Hartmore ..	762	ZBB	b. Camoens ..	738
YXM	b. Panayiotis ..	785	ZBC	b. Marconi ..	776
YXN	b. Rio Blanco ..	793	ZBE	b. Manchester Hero ..	775
YXO	c. Ballybunion ..	586	ZBG	b. Tamaqua ..	802
YXR	b. Princess Maud ..	791	ZBI	b. Wyncote ..	813
YXS	b. Vardulia ..	806	ZBJ	b. Devon ..	750
YXT	b. Penolver ..	787	ZBL	b. Northumberland ..	783
YXV	b. Scottish Prince ..	796	ZBM	b. Westmoreland ..	811
YXX	b. Clan Mackenzie ..	744	ZBN	b. Moliere ..	779
YXZ	b. Grelgrant ..	761	ZBO	b. Wanderer ..	808
YYA	b. Singapore ..	798	ZBS	b. Monarch ZBS ..	779
YYB	b. Manchester Cor-		ZBT	b. Leitrim ..	771
	poration ..	775	ZBU	b. Carib Prince ..	739
YYC	b. Anglo-Mexican ..	727	ZBV	b. Salvador ZBV ..	795
YYD	b. Medway ..	777	ZBY	b. Norriston ..	783
YYE	b. Lapland YYE ..	771	ZBZ	b. Queensgarth ..	791

		PAGE			PAGE
ZCB	b. Clan Macphee ..	745	ZFW	b. Soldier Prince ..	798
ZCC	b. Clan Maclean ..	745	ZFY	b. Czaritz ..	749
ZCD	b. Belltown ..	733	ZGB	b. Rhodesian Trans- port ..	793
ZCE	b. Liberty ..	771	ZGC	b. Malvern Range ..	774
ZCF	b. Classic ..	747	ZGD	b. Briarwood ..	736
ZCG	b. Ebani ..	752	ZGE	b. Clan Macintosh ..	744
ZCI	b. Loyalty ..	667	ZGG	b. City of Manchester ..	744
ZCJ	b. Newhaven ZCJ ..	781	ZGH	b. Santeramo ..	795
ZCK	b. S. Denis ..	801	ZGI	b. Roman Prince ..	793
ZCM	b. Valdivia ZCM ..	806	ZGK	b. Italian Prince ..	767
ZCN	b. Antinous ..	728	ZGM	b. Alexandrian ..	727
ZCO	b. Nottingham ..	783	ZGN	b. Varsova ..	806
ZCP	b. Archangel ..	729	ZGO	b. Nubian ..	783
ZCS	b. Wyvisbrook ..	813	ZGP	b. Median ..	777
ZCX	b. Grelhead ..	761	ZGQ	b. Meltonian ..	777
ZCZ	b. Southgate ..	799	ZGR	b. Trevisa ..	805
ZDA	b. Haigtown ..	761	ZGS	b. Napierian ..	781
ZDC	b. Circe Shell ..	741	ZGU	b. Oranian ..	784
ZDE	b. Tregarthen ..	804	ZGW	b. Scythian ..	796
ZDI	b. Hunsbrook ..	765	ZGZ	b. Hazel Branch ..	762
ZDM	b. Lord Antrim ..	772	ZHE	b. Vasna ..	807
ZDO	b. Imani ..	765	ZHF	b. City of Manila ..	741
ZDP	b. American Transport ..	727	ZHG	b. Acajutla ..	725
ZDR	b. Indian Transport ..	766	ZHH	b. Architect ..	729
ZDS	b. Cape Transport ..	738	ZHJ	b. Dibble Bridge ..	750
ZDT	b. British Transport ..	736	ZHK	b. Vennachar ..	807
ZDU	b. Canadian Transport ..	738	ZHL	b. Catalina ZHL ..	739
ZDV	b. Panama Transport ..	785	ZHM	b. Conway ..	747
ZDW	b. Egyptian Transport ..	753	ZHO	b. Teviot ..	803
ZDX	b. War Sky ..	810	ZHP	b. Glenspey ..	759
ZDY	b. Tregarth ..	804	ZHS	b. Clan Chattan ..	742
ZDZ	b. Ocean Transport ..	784	ZHT	b. Clan Macbride ..	743
ZE	b. Queensland Trans- port ..	791	ZHU	b. Clan Robertson ..	746
ZEC	b. Cove ..	748	ZHV	b. Clan Macdonald ..	743
ZED	b. Pacific Transport ..	785	ZHW	b. Dryden ..	751
ZEE	b. Tasmanian Trans- port ..	802	ZHX	b. Elswick House ..	753
ZEF	b. Derwent River ..	750	ZHY	b. Siddons ..	797
ZEG	b. Fraser River ..	757	ZHZ	b. Socrates ..	798
ZEH	b. Gambia River ..	757	ZIA	b. Lady Rhondda ..	770
ZEK	b. Sagama River ..	795	ZIB	b. Plutarch ..	788
ZEM	b. Orange River ..	784	ZIC	b. Tamarac ..	802
ZEN	b. Lynton Grange ..	773	ZIH	b. Sea Serpent ..	796
ZEP	b. Dolphin Shell ..	751	ZII	b. Rhesus ..	793
ZEQ	b. Oaklands Grange ..	783	ZIK	b. Glenelg ..	759
ZER	b. Rounton Grange ..	794	ZIL	b. Patani ..	786
ZES	b. Genesee ZES ..	711	ZIN	b. Volga ..	807
ZET	b. Sunland ..	800	ZIO	b. Netherpark ..	781
ZEV	b. Globe ..	759	ZIR	b. Sellasia ..	797
ZEW	b. Havre ..	762	ZIS	b. Cloutsham ..	747
ZEY	b. Erivan ZEY ..	754	ZIT	b. River Araxes ..	793
ZFA	b. Rosalind ..	794	ZIV	b. Maple Branch ..	775
ZFB	b. Boliviana ..	735	ZIZ	b. Polgowan ..	788
ZFC	b. Cairnmona ..	737	ZJA	b. Seattle ..	796
ZFD	b. Graciana ..	760	ZJB	b. Ariosto ..	729
ZFE	b. Monestoy ..	779	ZJC	b. Domingo de Larri- naga ..	751
ZFF	b. Indiana ZFF ..	766	ZJD	b. Bournemouth ..	735
ZFG	b. Segura ..	797	ZJE	b. Chipana ..	740
ZFI	b. Caterino ..	739	ZJF	b. Quantock ..	791
ZFK	b. Messina ..	778	ZJG	b. Sutton Hall ..	800
ZFL	b. Oristano ..	784	ZJH	b. Warcuta ..	809
ZFM	b. Rossano ..	794	ZJI	b. Ping Suey ..	711
ZFN	b. Yoserio ..	813	ZJK	b. Agamemnon ZJK ..	726
ZFP	b. Baron Sempill ..	732	ZJM	b. Tydeus ..	805
ZFS	b. Czar ..	749	ZJN	b. Pak Ling ..	785
ZFT	b. Kaffir Prince ..	767	ZJO	b. Pinemoor ..	787
ZFU	b. Merchant Prince ..	778	ZJP	b. Agapenor ..	726
ZFV	b. Norman Prince ..	783	ZJQ	b. Alcinous ..	726

		PAGE			PAGE
ZJS	b. Hector	763	ZNG	b. Vedic	807
ZJT	b. Helenus	763	ZNH	b. Start Point	799
ZJX	b. Aylestone	731	ZNI	b. Raranga	792
ZJZ	b. Teiresias	802	ZNJ	b. Hartside	762
ZKA	b. Telamon	802	ZNL	b. Donax	751
ZKC	b. Tyndareus	805	ZNM	b. Tintoretto	803
ZKD	b. Elpenor	753	ZNN	b. Gordon Castle	760
ZKF	b. Astyanax	730	ZNO	b. Hindustan	763
ZKG	b. Atreus	730	ZNP	b. Tritonia	805
ZKH	b. Demodocus	750	ZNR	c. Kebkebia	583
ZKI	b. Hyson	765	ZNR	b. Falls City	755
ZKK	b. Myrmidon	780	ZNS	b. Niceto de Larrinaga	782
ZKL	b. Neleus	781	ZNU	b. Tanfield	802
ZKO	b. Yang Tsze	813	ZNX	b. Karagola	768
ZKP	b. Keemun	769	ZNZ	b. Port Napier	789
ZKQ	b. Dominic	751	ZOA	b. Tambov	802
ZKR	b. Tuscany	805	ZOB	b. Cromer	749
ZKS	b. Aberdonian	725	ZOD	b. Regina ZOD	792
ZKT	b. Carrigan Head	739	ZOE	b. Newby Hall	781
ZKU	b. Mytilus	780	ZOF	b. Manchester Shipper	775
ZKV	b. Valacia	806	ZOG	b. Novgorod ZOG	783
ZKW	b. Glengyle	759	ZOH	b. Largo Law	771
ZKY	b. Benedict	733	ZOI	b. Albanian	726
ZLA	b. Crown of Cadiz	749	ZOK	b. Yaroslavl	813
ZLB	b. Glenavy	758	ZOL	b. Sheaf Don	797
ZLC	b. Blackwell	735	ZOP	b. Romeo	793
ZLE	b. Dunstan	752	ZOQ	b. Baron Renfrew	732
ZLF	b. Capelhall	738	ZOS	b. Rotterdam ZOS	794
ZLH	b. Highland Star	763	ZOU	b. Graf Stroganoff	760
ZLJ	b. Ekaterinoslav	753	ZOV	b. Quentin	791
ZLK	b. British Emperor	736	ZOW	b. Jervaulx Abbey	767
ZLL	b. Intombi	766	ZOX	b. Glenlyon	759
ZLM	b. Voronej	807	ZPC	b. Nascopie	781
ZLO	b. Oliva	784	ZPD	b. Port Lyttleton	789
ZLP	b. Glenamoy	758	ZPE	b. Cornish Point	748
ZLQ	b. Kerman	769	ZPF	b. Aldworth	727
ZLR	b. Italian	767	ZPG	b. Roumelian	794
ZLS	b. Cutcombe	749	ZPH	b. War Babine	808
ZLT	b. Port Elliot	789	ZPI	b. Calonne	737
ZLU	b. Port Sydney	790	ZPJ	b. Freienfels	757
ZLV	b. Figue	756	ZPL	b. Pennyworth	787
ZLX	b. F. A. Tamplin	755	ZPN	b. Clan Stuart	746
ZLY	b. Tartar Prince	802	ZPO	b. Shuna	797
ZLZ	b. Chama	740	ZPP	b. Baron Elcho	732
ZMA	b. Arabistan	728	ZPQ	b. Warrior	810
ZMA	b. War Magpie	809	ZPR	b. Barotse	732
ZMB	b. Prahsu	790	ZPS	b. Bechuana	733
ZMD	b. Holms Island	764	ZPT	b. Griqua	761
ZME	b. Bendu	733	ZPU	b. Amatonga	727
ZMF	b. Benue	734	ZPW	b. Longnewton	772
ZMH	b. Polladern	788	ZPX	b. Unio	806
ZMI	b. Shonga	797	ZQA	b. Baronesa	732
ZMJ	b. Bassam	732	ZQC	b. Duquesa	752
ZMK	b. Gaboon	757	ZQD	b. Marquesa	776
ZMM	b. Onitsha	784	ZQE	b. Princesa	790
ZMP	b. Zaria	813	ZQG	b. Euclid	755
ZMQ	b. Benguela	733	ZQH	b. Sallust	795
ZMR	b. Benin	734	ZQI	b. Virgil	807
ZMS	b. Kaduna	767	ZQJ	b. Duffield	751
ZMT	b. Kwarra	770	ZQK	b. Clan Malcolm	745
ZMU	b. Salaga	795	ZQL	b. Manchester Merchant	775
ZMV	b. Eburna	752	ZQN	b. Manchester Port	775
ZMW	b. Cowrie	748	ZQO	b. Celtia	739
ZMY	b. Sibir	797	ZQP	b. War Sioux	810
ZNA	b. Turbo	805	ZQQ	b. Alesia	727
ZNB	b. Barima	731	ZQR	b. Umvuma	806
ZNC	b. Grampian Range	760	ZQS	b. Banchor	731
ZND	b. Maplemore	776	ZQT	b. Nawab	781
ZNF	b. Gambada	757	ZQU	b. Huntscastle	765

		PAGE			PAGE
ZQV	b. Manchester Civilian	775	ZTZ	b. King John ..	769
ZQW	b. Manchester Exchange ..	775	ZUD	b. Errington Court ..	754
ZQX	b. Ashwin ..	730	ZUD	b. Soroka ..	799
ZQY	b. Manchester Importer ..	775	ZUE	b. Alert ZUE ..	727
ZQZ	b. Manchester Mariner	775	ZUF	b. Trehawke ..	804
ZRA	b. Larne ..	771	ZUG	b. Taption ..	802
ZRB	b. Kingsmere ..	769	ZUH	b. Trevethoe ..	805
ZRC	b. Dotterel ..	751	ZUI	b. Trecarne ..	804
ZRF	b. Eden Hall ..	752	ZUK	b. Linmore ..	772
ZRG	b. Red Cap ..	792	ZUL	b. Athenic ZUL ..	730
ZRH	b. Clemenceau ..	747	ZUN	b. Orient City ..	784
ZRI	b. Baron Cathcart ..	731	ZUO	b. Tresillian ..	804
ZRJ	b. Roath ..	793	ZUR	b. Foyle ZUR ..	756
ZRK	b. Strathfillan ..	799	ZUT	b. Ikala ..	765
ZRL	b. Baron Dalmeny ..	731	ZUW	b. Grelcaldy ..	761
ZRM	b. Sanday ..	795	ZUY	b. Boyne ..	735
ZRN	b. Reindeer ZRN ..	792	ZUZ	b. Cardiff Hall ..	738
ZRO	b. Chelston ..	740	ZVB	b. Lord Sefton ..	772
ZRP	b. War Jandoli ..	809	ZVC	b. Glennevis ..	759
ZRR	b. Scottier ..	796	ZVE	b. Amberton ..	727
ZRS	b. Anglo-Chilean ..	727	ZVF	b. Aral ..	729
ZRT	b. Mendip Range ..	777	XVH	b. Nurtureton ..	783
ZRU	b. War Island ..	809	ZVI	b. Appleleaf ..	728
ZRU	b. Cosmos Volga ..	748	ZVJ	b. Middleham Castle ..	779
ZRV	b. Katie ..	768	ZVL	b. Lord Byron ..	772
ZRW	b. Queen Margaret ..	791	ZVM	b. Hornby Castle ..	764
ZRX	b. Lowther Castle ..	773	ZVT	b. Vigo ..	807
ZRY	b. Royal George ZRY ..	794	ZVU	b. Aleppo ..	727
ZRZ	b. Royalstar ..	795	ZVV	b. Morocco ..	780
ZSA	b. Clan Murdoch ..	745	ZVX	b. Zamora ..	813
ZSF	b. Meline ZSF ..	777	ZVY	b. Baygowan ..	733
ZSH	b. Chatham ..	740	ZVZ	b. Baycross ..	732
ZSI	b. Ethelaida ..	755	ZWA	b. Poltolia ..	788
ZSJ	b. Llanberis ..	772	ZWC	b. Seapool ..	796
ZSK	b. North Pacific ..	783	ZWD	b. Crown of Cordova ..	749
ZSL	b. Eider ..	753	ZWF	b. Quito ..	791
ZSN	b. Pentakota ..	787	ZWH	b. Madras City ..	773
ZSP	b. Pundua ..	791	ZWL	b. Fishpool ..	756
ZSQ	b. Palitana ..	785	ZWN	b. Eastwood ..	752
ZSR	b. Virawa ..	807	ZWP	b. Lucellum ..	773
ZSU	b. Port Stephens ..	790	ZWQ	b. Fieldmarshal ..	756
ZSV	b. Port Pirie ..	789	ZWS	b. Hartlepool ..	762
ZSW	b. Port Melbourne ..	789	ZWU	b. Penrose ..	787
ZSX	b. Altai ..	727	ZWV	b. Yonne ..	813
ZSY	b. War Toronto ..	811	ZWW	b. Craonne ZWW ..	748
ZSZ	b. Laomedon ..	771	ZWX	b. Trident ZWX ..	805
ZTA	b. Polglass Castle ..	788	ZWY	b. Waddon ..	807
ZTB	b. Theseus ..	803	ZWZ	b. Manitou ..	775
ZTC	b. Media ..	777	ZXA	b. Zingara ..	813
ZTD	b. Inverawe ..	766	ZXB	b. Helmsloch ..	763
ZTE	b. Ebøe ..	752	ZXC	b. Belgic ..	733
ZTF	b. Princess Victoria ZTF ..	791	ZXE	b. Sheaf Brook ..	797
ZTG	b. War Halifax ..	809	ZXG	b. Student ..	800
ZTH	b. Abbassieh ..	725	ZXH	b. Hesleyside ..	763
ZTI	b. Siberian Prince ..	797	ZXI	b. Farnworth ..	755
ZTJ	b. Royal Scot ..	794	ZXJ	b. Parthenia ..	785
ZTL	b. Gordonia ..	760	ZXK	b. Clan Macmaster ..	745
ZTN	b. War Moncton ..	809	ZXL	b. Batsford ..	732
ZTQ	b. Huntspill ..	765	ZXM	b. Doonholm ..	751
ZTR	b. S. Pablo ..	801	ZXN	b. Penmorvah ..	786
ZTT	b. Navarino ..	781	ZXO	b. Montilla ..	779
ZTU	b. Bavarian ..	732	ZXP	b. Rubiera ..	795
ZTW	b. Trefusis ..	804	ZXQ	b. Camana ..	737
ZTW	b. War Aconite ..	808	ZXR	b. Normanstar ..	783
ZTX	b. Cromarty ..	749	ZXS	b. Fotinia ..	756
ZTY	b. Cape Ortegal ..	738	ZXT	b. Hamm ..	711
			ZXT	b. Hamm ..	762
			ZXU	b. Hollinside ..	764

Call Letters allotted to Land and Ship Stations 1025

	PAGE		PAGE
b. Molesey	779	ZZA	b. Bencleuch 733
b. Baygola	733	ZZB	b. General Allenby .. 757
b. Bayverdun	733	ZZC	b. Pennard 786
b. Bayronto	733	ZZD	b. Matra 777
b. Hannah	762	ZZE	b. Massis 777
b. Everilda	755	ZZF	b. Pendragon Castle .. 786
b. Kassala	768	ZZG	b. Laurel Branch .. 771
b. Parktown	785	ZZI	b. Grelwen 761
b. Sea Glory	796	ZZL	b. Cypria 749
b. Ismailia	766	ZZM	b. Plumleaf 788
b. Hunsgate	765	ZZN	b. Cherryleaf 740
b. Petroleine	787	ZZO	b. Pearleaf 786
b. Greystoke Castle ..	761	ZZP	b. Orangeleaf 784
b. Newlands	781	ZZQ	b. Brambleleaf 735
b. Somersby	799	ZZR	b. Aragaz 729
b. Swainby	800	ZZS	b. Hyrcania 765
b. Delmira	750	ZZU	b. Racia 791
b. British Princess ..	736	ZZV	b. Pavia 786
b. British Sovereign ..	736	ZZW	b. Tyria 805
b. British Ensign ..	736	ZZX	b. War Torrent 811
b. British Isles ..	736	ZZX	b. Cosmos Don 748
b. British Admiral ..	736	ZZZ	b. Marwarri 776
b. British Empress ..	736		

METEOROLOGICAL SECTION

- (A) Radio-communication and Meteorology.
- (B) Wireless and Time.
- (C) Arrangements Current in various Countries.

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RADIO-COMMUNICATION AND METEOROLOGY

BY LT.-COL. E. GOLD, D.S.O., F.R.S.,
Assistant Director of the Meteorological Office.

I.—GENERAL.

METEOROLOGY may be divided broadly into two great branches—(a) “climatology,” or the analysis and classification of the records of past weather, and (b) “weather forecasting,” or the deduction of future weather from the present and past conditions. Each of these main branches has numerous ramifications, and neither can be regarded as independent of the other; indeed, climatology depends for its usefulness mainly on the fact that future conditions will on the average be nearly identical with past conditions, and climatology is in this respect generalised forecasting. When the children of Israel left Egypt for Palestine they put their trust in a climatological “forecast.” When the British Army, on the evening of November 19th, 1917, issued orders for the attack on Cambrai to begin the following morning, it put its trust in a “weather forecast”—a weather forecast so excellent that the General commanding the Tank Corps which led the attack characterised it as a forecast as accurate as a description could have been of the wind, weather and visibility.

Both types of information are essential to success in peace as in war. The transport company which issues instructions for precautionary measures against frost at the beginning of each winter relies on a climatological forecast; a wise company will utilise the information given in weather forecasts of the probable termination of a mild spell in winter to draw the attention of all concerned to the precautionary measures. The man who contemplates the erection of sheds for drying timber wants a climatological forecast of the winds, the rainfall and the humidity, so that he may choose the most suitable place available, and so that he may give his sheds the correct orientation, and know beforehand how much natural drying he can, in the long run, depend upon. The road surveyor who contemplates tarring a stretch of road wants a “weather” forecast so that he may not find his tarring operations wasted by a heavy fall of rain immediately afterwards.

These examples have been chosen because they refer to aspects of meteorological usefulness which are not so obvious as the applications to agriculture, fishing and aviation.

It has been said that the function of science is to replace experience, to enable one man to profit by the experience of another, and to save him the troubles and disappointments which are the inevitable companions of the man who insists on accumulating unnecessary experience for himself. In no branch of science is this *economy* more marked than in meteorology. The experience of an observer on a lonely island in the Hebrides, interpreted by the scientific expert in meteorology, may save the Yarmouth fishing fleet the loss of its nets, perhaps even the

lives of its sailors. A few readings of the barometer plotted on a chart furnish to the expert the means of supplying to the artillery the wind in the upper air to be allowed for in shooting, when no direct means of observing that wind are available.

Wireless telegraphy is directly applicable only in the preparation and distribution of "weather" forecasts; but since climatological forecasts must give the average conditions and frequency of occurrence of precisely those weather characteristics which are necessary for an accurate description of existing weather and for a "weather" forecast, climatology will in the end depend very largely upon the observations which wireless telegraphy transmits, as these are the observations which will be most generally recorded and most carefully scrutinised.

II.—METEOROLOGY AND WAR.

(a) *Troy to Waterloo.*

The importance of the weather in military operations is shown in history from the earliest times. Sir Napier Shaw, in the "Weather Map," quotes an episode in a Syrian campaign illustrating its control of Q.

"Now they that were in the town sent messengers unto Tryphon to the end that he should hasten his coming unto them by the wilderness, and send them victuals.

"Wherefore Tryphon made ready all his horsemen to come that night; but there fell a very great snow, by reason whereof he came not."

Even earlier than this, the Greek fleet was kept by contrary winds for weeks on the western side of the Ægean Sea until the leaders were at their wits' end for expedients to keep the growing dissatisfaction in the ranks from breaking up the expedition against Troy. Achilles' caustic comment on the weather prophet of that time is still appropriate to those quacks who pretend to an intuitive perception of future weather: "The prophet! What is he? A man who speaks 'mongst many falsehoods but few truths, whene'er chance leads him to speak true."

Hannibal's grand campaign failed largely owing to the imperfectly realised climate of the Alps in October.

A spell of north-east winds in September, 1066, kept William the Conqueror's fleet on the shores of Normandy and brought Harold Hardrada to the Yorkshire coast; the English Harold was drawn from his defence against the Norman, lost officers and men whom he could ill spare in the hard-won victory of Stamford Bridge, and returned to find that the break up of the spell had permitted William to cross the Channel and effect a landing unopposed. The north-east winds of that September were as momentous as any in history.

In July, 1588, the same south-westerly breeze before which the Spaniards sailed up the English Channel indicated "a depression on the Atlantic," the precursor of the stormy series which consummated the destruction of the Armada.

The thick morning mist at Blenheim on August 13th, 1704, enabled Marlborough to surprise the French and gain the initial advantage in that critical battle.

The heavy rain during June 17th, 1815, and the following night was responsible for Napoleon's delay in beginning the battle of Waterloo on the 18th; besides rendering the ground more difficult for his attacks, the rain therefore made a further contribution to his utter defeat by the postponement which gave time for Blücher and his army to reach the field and take part in the final stages of the battle.

(b) *The Crimean War and the Birth of Synoptic Meteorology.*

In all these cases the weather had been regarded as an unforeseeable, unavoidable blessing or calamity; but a new era dawned in the middle of the nineteenth century with the invention of the electric telegraph and the progress of scientific enterprise; the final stimulus came from war, or rather from an incident in a campaign where even a fair "climatological" forecast would have saved the British Army untold loss and suffering. On November 14th, 1854, during the Crimean war, a storm burst suddenly upon the British and French fleets in the Black Sea, and did much damage, wrecking one French battleship. The French astronomer, Leverrier, joint-discoverer with John Couch Adams of the planet Neptune, collected evidence which showed that the storm had travelled across Europe and might have been foreseen, had telegraphic reports been available at a central office. Actually, indeed, a project of this kind had been advocated in England in 1848 at the annual meeting of the British Association for the Advancement of Science, but sufficient support was not forthcoming to give effect to the proposal, although the *Daily News* had published in June, 1849, a collection of reports from about thirty places. Leverrier's report made the French Government move; and the meteorological department of the British Board of Trade, established in 1854 under Captain (afterwards Admiral) Fitzroy, also took steps to organise a telegraphic system of reports, being stimulated further in its efforts by the "Royal Charter" storm of October 26th, 1859. After organising a system for collecting reports, Fitzroy also inaugurated a scheme of storm warnings and weather forecasts, before he had satisfied the scientific society of his day that these forecasts and warnings were established on a sound basis of principle; criticism and opposition arose, and Fitzroy died an untimely death in April, 1865; at the end of the following year the forecasts were discontinued for thirteen years until 1879, although the warnings of storms were recommenced in 1867, after a brief interval, their renewal being apparently due to pressure through Parliament.

(c) *The European War.*

At the outbreak of the European war in 1914 there was a tolerably complete network of meteorological stations in Europe contributing observations daily at 0700 Greenwich time, and for a few stations, again at 1800; additional reports were also made at 1300 or 1400, mainly for use during the summer months in the preparation of harvest forecasts, although in France the reports at 1400 were more general and more fundamental in the organisation of their service than the reports at 1800.

None of the military services, however, understood the importance and the power of the scientific development of meteorology which had taken place in the preceding 35 years; the forecasts in the daily Press

constituted the meteorological pabulum of 99 per cent. of the nation, and these were over twelve hours old before they were read; of the functions of meteorology outside these forecasts hardly any conception existed. The principal aim of those in power was to prevent the enemy securing meteorological reports, whereas this should have been a matter of secondary importance compared with the necessity for a right use by ourselves. Lieut. J. Rouch, of the French Navy, who was head of the French military meteorological service in 1916-17, relates that in April, 1915, a French Admiral, attached to the Army, busied himself with the preparation of a weather chart. To someone who evidently thought he might have been better employed the Admiral remarked: "I know that we are forbidden to publish meteorological observations to the enemy, but I did not know that we pushed the spirit of chivalry so far as to interdict their use by ourselves."

When the first Zeppelin raid was effected and bombs dropped in the Eastern Counties, my suggestion that the objective had been London and that the design had been frustrated by an unanticipated upper wind was immediately verified by the meteorological reports. This information stimulated the military authorities, and as it was shortly followed by the first German gas attack a move was made towards the establishment of a military meteorological service in the field. This began in June, 1915, in France. Col. H. G. Lyons, F.R.S., inaugurated the service at St. Omer on June 10th, and then returned to London to arrange for a service at Gallipoli. The development of the service was gradual, but the wonderful elasticity of the British Army allowed much to be done for which no authorised establishment existed. With the prospect of a direct use of wind in retaliatory gas attacks the Army Command felt it necessary to test beforehand the accuracy of the forecasts; they stood the test so well that the decision to attack at Loos on September 25th was taken the preceding evening, at a time when the wind was blowing strongly from south-east, on the strength of the meteorologists' forecast of a change to south-west in the interval between the decision and the time of attack; the change occurred as predicted, though three hours after the discharge of gas the wind changed back to the east side of south. This was the first of a long series of gas attacks, of which the most brilliant, from a meteorological point of view, occurred in March, 1918. On that occasion, gas was projected on the advice of the meteorologist in a light westerly wind, although the wind ten miles west of the place of discharge was *easterly*.

Wireless was not used in the war on land for the distribution of meteorological information so much as it might have been. This was partly due to the slow development of the "continuous wave" system which was essential to success.

In 1916 the distribution of reports to the Artillery appeared eminently a task for wireless. These reports contained the particulars of wind and temperature required by the gunners to admit of accurate shooting from the map: they were issued from Army Headquarters and transmitted to each battery: to ensure the best results it was essential that the reports should reach the batteries within one hour of the time of issue. Under normal conditions this was achieved by ordinary telegraphy, but during a battle delays were frequent. The significance of this was, however, inadequately realised in 1916 and the Artillery experts thought it inexpedient to alter the then existing

method of distribution, although the Royal Flying Corps was willing to use its wireless service in co-operation. A year later the Artillery were ready to adopt wireless, but by that time the methods of aerial warfare had changed so much that the Royal Flying Corps was unable to lend the necessary co-operation of its wireless personnel and instruments; and the resources of instruments and trained personnel outside the Flying Corps were quite inadequate to permit of the reception at the batteries of broadcasted meteorological messages issued every four hours. Besides these reports to the Artillery, "Meteor Reports," as they were called for brevity, additional similar reports were required by the sound-ranging sections, as the effect of wind and temperature on sound-ranging could only be allowed for by a rapid distribution of special meteorological reports every hour during sound-ranging weather. These were distributed by wireless in 1918.

As night-flying developed the need for short-period forecasts, covering about six hours, and rapidly distributed, was emphasised; and in 1918 these were distributed in code twice each evening by wireless from Montreuil; in 1918, too, reports of upper winds up to 20,000 feet were also issued by wireless for the use of the Royal Air Force; each of these reports indicated the information on which it was based and the changes anticipated before the next report issued four hours later.

The Germans distributed reports of meteorological conditions by wireless as early as 1916. At first, the information was mainly a statement of conditions in the upper air at Bruges, and this was received by the British meteorological service and utilised in connection with other reports, the observations of temperature and humidity at different heights being regarded as the most valuable data in the messages. Later on, German reports were issued by wireless from several bases and an examination of the reports issued in 1918 indicated that they had adopted the British system of ballistic winds and temperature; but it also showed that changes of wind were usually anticipated by the British service two to four hours earlier than by the German service, so that the British gunners were better served in this respect than the German.

III.—THE EXISTING FORECAST SYSTEM OF WESTERN EUROPE, AND THE CONSTRUCTION OF WEATHER CHARTS.

The principal features of the existing system of forecasting may be outlined as follows:—

1. A network of observing stations exists at which coastguards, lighthouse keepers, schoolmasters, clergymen, and others, make observations two, three or four times daily at 0100, 0700, 1300 or 1400, 1800, and transmit their observations, either immediately or with those for the following time of observation, by telegraph to a national headquarters.

These reports are made in a simple code consisting essentially of two five-figure groups, in which the barometer (three figures), the wind (three figures) and the temperature (2 figures) are given as accurately as the observations permit; of the remaining two figures, one is utilised for reporting the weather at the time of observation and the other for indicating the direction of motion of upper cloud or the weather since the preceding report, according to the time at which the report is made.

These two fundamental groups are supplemented invariably in the more advanced countries by a third group giving the character and magnitude of the barometric change in the three hours preceding the time of the report (three figures); the remaining two figures of this group are allotted to rainfall in reports at 0700 and for varying purposes in reports at other hours. There is a further supplementary group at 0700 giving the maximum and minimum temperature (four figures) and the sea disturbance (one figure).

This is the so-called "old international system," introduced after a congress at Utrecht in 1874 and modified at Berlin 1910 and at Rome 1913. Its use for the exchange of reports between different countries is gradually ceasing, and most services have already introduced additional information into their reports for national purposes.

2. This network of semi-official stations is supplemented by a few observatories at which fuller records are maintained, but the reports are usually in the same code as those from the semi-official stations. Reports of the wind obtained by observation of small free balloons are, however, often added three or four times daily when weather conditions permit the balloon to be watched to a reasonable height by the special theodolite used for this work.

3. The reports referred to in 1 and 2 are collected at the central office and transmitted, usually by air-line or cable, but in a rapidly increasing number of cases by wireless, to other national central offices.

4. The home and foreign reports obtained as described are decoded at the central office, tabulated and charted. The fundamental reason for charting the observations is well stated by the astronomer Halley in presenting to the Royal Society in 1686 an account of the trade winds. He says: "To help the Conception of the Reader in a Matter of so much Difficulty, I believed it necessary to adjoyn a Scheme, showing at one View all the various Tracts and Courses of these Winds: whereby 'tis possible the Thing may be better understood than by any verbal Description whatsoever."

The charts of the present day portray the pressure, the temperature and the weather, as well as the wind and the character of the changes of pressure in progress, while supplementary charts indicate the distribution of cloud, of upper wind, of visibility and of the weather since the last report. The fundamental chart remains that of pressure, wind and weather.

No two charts for an extensive region are alike, but a brief examination of a series of charts shows that some features in the distribution of pressure are always recurring and are accompanied by weather of the same general character. Most prominent are regions of low and high pressure in which the isobars form closed curves. These are called cyclones and anti-cyclones respectively. The term cyclone was introduced by Piddington about 1846 in connection with the circular storms of the Bay of Bengal and Indian Ocean. It has been generally adopted, but is now used to denote the more extensive but less intense depressions of temperate latitudes, while Piddington's cyclones are frequently distinguished as "tropical." The term "anti-cyclone" was introduced in 1863 by the famous meteorologist and anthropologist, Francis Galton, author of *Meteorographica*.

Broadly speaking, in an anticyclone quiet, rainless weather

prevails; the sky may be overcast or it may be cloudless, and different parts of the same anticyclone may be different in this respect; but wherever the cloud exists there is practically always an increase of temperature just above its upper limit. There are, however, exceptions to this general rule of rainless weather and occasionally quite heavy rain occurs in some part of an anticyclonic region. In cyclones, on the other hand, the weather is usually unsettled and windy: rain does not fall over the whole area, but very few cyclones are free from rain in some parts.

The charts prepared at the central office are compared with the immediately preceding charts and with similar distributions in previous years, the latter comparison being partly conscious and partly subconscious. The well-known relation between the wind and the pressure distribution is considered and the effects of radiation and temperature differences, horizontally and vertically, are taken into account and a forecast prepared of the changes in the distribution of wind, weather, temperature, cloud and visibility. All this is done at the central office and the accuracy with which the trained expert can balance the evidence and arrive at a definite judgment is surprising.

5. The principal weakness of the system is its onesidedness: the organisation is practically devoted to the collection and analysis of the reports: the distribution of the information after it leaves the central office is in non-professional hands. This weakness was recognised before the war and the need for local distributing centres was pressed, but funds were not available for their establishment. A concurrent and consequent weakness is the inability of a central forecasting office to estimate and allow for the variety of detail which characterises the weather of a sub-area: the central office inevitably generalises the weather of an area: the local forecaster is able, on the other hand, to concentrate his whole attention on the weather of his area and to emphasise the important details. It might be thought that this could be remedied by allocating different areas to different forecasters at headquarters, but in practice this would involve a vast centralisation of local reports and it would ignore the fact that a forecaster is human and feels the keenest interest in the weather of the region which he occupies. A further defect in the existing system is the lack of differentiation between the requirements of meteorological exchange between neighbouring countries and the exchange between countries long distances apart. In the next section an indication will be given of the manner in which these defects are likely to be remedied. Some progress has already been made in the British Meteorological Service by the location of professional meteorologists in various places, mainly at aerodromes such as Croydon, Lympne (Folkestone), Calshot (Southampton), Plymouth, Manchester, Baldonnell (Dublin), Cranwell (Lincoln), Howden (near Hull), Renfrew, Felixstowe, Isle of Grain.

It remains to add here that in pre-war meteorology wireless was used mainly for collecting reports from ships in the Atlantic; practically the only collective reports issued were those from the Eiffel Tower at 1000 and 1700 G.M.T. At the present time collective reports are being issued by wireless all over the world. The leading ones in Europe are: Eiffel Tower, Air Ministry, Scheveningen, Warsaw, Prague, Nauen (Berlin), Copenhagen, Rome, Christiania, Karlsborg (Sweden), Reval.

IV. — FUTURE DEVELOPMENTS.

The general plan is outlined in its meteorological aspect in Annex G of the Convention relating to International Air Navigation [Peace Conference, Paris, 1919]. The necessary auxiliary wireless arrangements are set out in a communication by Colonel Blandy, D.S.O., R.A.F., to a conference of meteorologists of the British Dominions in London, September, 1919.

A summary of the schemes, with modifications, is given here.

First, international hours of observation for the reports, on which synoptic charts are to be based are selected on the principle that they should be frequent enough for all practical purposes and so chosen that they could be adopted all over the world with the minimum alteration of existing times of report. The hours selected are 0100, 0700, 1300, 1900 Greenwich Mean Time.

Secondly, the symbols or letters for use in specifying meteorological codes are set out and defined so that they can be used everywhere with a single definite meaning. They are as follows:—

BBB=Barometer reduced to sea-level and expressed in millibars and tenths—*i.e.*, corrected for temperature, gravity, and index error. Initial 9 or 10 omitted.

BB=Barometer reduced to sea-level and expressed in *whole* millibars. Initial 9 or 10 omitted.

DD=Direction of wind (true direction, as distinguished from magnetic—on scale 1-32).

F=Force of wind on Beaufort Scale (wind above force 9 to be specially noted at end of telegram).

D₁=Direction of motion of low cloud [2=east, 4=south].

V₁=Speed of low cloud [1=0-9, 2=10-18, 3=19-27 m.p.h., etc.].

ww=Present weather (special code).

TT=Temperature in degrees.

T₁T₁=Temperature of sea.

A=Form of low cloud [cumulus, nimbus, stratus, etc.].

L=Amount of low cloud [in tenths of sky covered, amount 10 telegraphed as 0].

a=Form of medium or high cloud [cirrus, alto-cumulus, etc.].

N=Amount of total cloud, in tenths.

h=Height of base of low cloud.

W=Weather since preceding report (special code).

V=Visibility (special code).

H₁=Relative humidity (special code).

S=State of sea and swell at coast stations.

K=State of sea and swell in open sea.

d=Direction of swell.

c=Characteristic of barometric tendency.

bb=Amount of barometric tendency in half-millibars per 3 hours : 50 added for negative tendencies.

RR=Rainfall in millimetres and tenths since last report.

MM=Maximum temperature in day.

mm = Minimum temperature in night.

r = Time at which rain or hail or snow or sleet began.

x = Check figure.

SPECIAL SYMBOLS FOR UPPER AIR REPORTS.

Wind.

h = Height above ground.

DD = Direction (scale 1-36).

VV = Speed in kilometres per hour (for speeds above 99 km. hr. add 50 to wind direction).

Pressure, Temperature, and Humidity.

BB = Pressure.

TT = Temperature (as above).

H = Relative humidity.

To these must be added the symbols for specifying the position of a reporting ship at sea :—

LLL = Latitude (degrees and tenths).

llll = Longitude (degrees and tenths).

Q = Quarter of globe in which ship is.

Thirdly, forms of report from individual stations or ships are chosen so that they will give the requisite information about the meteorological conditions at each place and will be readily incorporated in collective reports for transmission from local centres to national headquarters, and from national headquarters to distributive centres and to other national headquarters.

They are as follows, where each letter is replaced in actual reports by the appropriate figure giving the conditions at the time and place of report :—

(a) Reports for Synoptic Charts. Land Stations.

BBBDD FwwTT cbWVH ALANh RRMMr (orRRmmr).

(b) Reports for Synoptic Charts. Ships at Sea.

QLLLx llllx BBDDx FVKdx wwGGx TTT₁T₁x ANWrx yyyyz

(c) Reports of Wind and Weather at Auxiliary Land Stations or for Hourly Reports from Stations on Aerial Routes.

DDFD₁V₁ ALANh wwWVV₁ BBBK₁2D₂D₂V₂V₂.

These three forms of report, (a), (b), (c), are to be used in exactly the same form for collective messages : the information for each place or ship is preceded by a call sign for the station or ship in order to prevent any risk of mistake as to the place to which the information refers ; such mistakes are easily made if groups of figures are sent according to a fixed order of stations, especially when part of the collective message fails.

For collective reports of Class 1 the forms (a) and (b) are used. These reports therefore give full details for synoptic charts and for printed Daily Weather Bulletins.

For collective reports of Class 3 the form (c) is used. These therefore give the necessary local information to supplement the national

synoptic chart : and all that is required for aeroplane services on fixed routes.

For collective reports of Class 2 the following form is used :—

BBBDD FwwTT

the information for each place being preceded by the appropriate call sign.

These reports are intended for use in countries separated by long distances from the issuing country, *e.g.*, England and Italy, France and America.

It is not necessary that a meteorological office at Rome should have all the details of the meteorological conditions in the British Isles; but it is essential that it should have sufficient information to make a general synoptic chart and to know in broad outline what the distribution of weather is. It is further necessary that the meteorological office at Rome should know that the meteorological expert in London anticipates will be the weather changes in the next 10 to 20 hours. Accordingly, provision is made for the inclusion in collective reports of Class 2 of a brief forecast for each country whose reports are given in the message.

If different central offices are, for a moment, denoted by letters P, Q, R, . . ., and the different *local* centres in each country are denoted by letters with suffixes, P₁, P₂, P₃, . . . Q₁, Q₂, Q₃, . . ., then, under the scheme outlined, the following information will be available :—

At each central office P :—

(i.) Full reports for a selection of stations in each of the countries, P, Q, R . . . within a radius of 1,500 kilometres.

(ii.) Abbreviated reports of all countries, P, Q, R . . ., within a radius of 3,000 kilometres.

(iii.) Details of wind and weather for all sub-areas, P₁, P₂, . . ., Q₁, Q₂, within a radius of 500 kilometres.

(iv.) A 10 to 20-hour forecast for each country, P, Q, R

(v.) A short forecast covering 5 to 10 hours for every sub-area, P₁, . . ., P₄, P₃ . . ., in country P, and for sub-areas in other countries within a radius of 500 kilometres.

At each local centre P₁ . . . :—

(i.) Full synoptic charts for country P and neighbouring countries of the group.

(ii.) Full details for sub-area P₁ and all contiguous sub-areas.

(iii.) Forecasts for short periods for sub-area P₁ and contiguous sub-areas.

(iv.) National forecasts for 24 hours or more for country P.

The principal features of the codes referred to in the above definition of symbols are as follows :—

Two figures (01 - 99) are used to denote the weather conditions and provision is made for indicating the character and intensity of precipitation, *e.g.*, thick drizzle, slight snow, moderate rain, heavy rain, passing hail showers, continuous heavy snow.

Four figures are used to indicate the forms of cloud and the amounts of different forms present.

One figure is used to denote the height of the lowest cloud present.

One figure is used to denote the degree of relative humidity.

One figure is used for the visibility.

One figure is allocated to report the swell of the sea, and simultaneously to indicate the general character of the waves.

One figure is used to indicate the time at which precipitation began to fall.

All this information is additional to that given hitherto in telegraphic reports, and represents the meteorologist's advance in dealing with the problem of furnishing accurate weather reports.

The "communications" arrangement are briefly as follows:—

In each country the national arrangements for collecting and distributing information for national purposes is left to the nation concerned—telegram, telephone, and wireless will probably all be used. Communication to aeroplanes in the air will be by wireless telephony, and usually in plain language from the decoded reports of class (c).

For collective reports of Class 3 each country will also make its own arrangements; but, as these will frequently be hourly reports for use on aerial routes, neighbouring countries will be kept informed of details as to times of transmission and wavelengths. For example, from Great Britain to France such transmission is already being made on a wavelength of 1,400 m. at each hour from 0745 to 1445.

For other collective reports the following groups and sub-groups of countries have been arranged:—

- A1. British Isles.
- A2. Iceland, Denmark, Norway, Sweden.
- A3. Archangel, Esthonia, Finland.
- B1. France, Belgium, Holland.
- B2. Spain, Portugal.
- B3. French North Africa.
- B4. Switzerland.
- C1. Italy, Malta, Serbia.
- C2. Egypt, Libya, Palestine.
- C3. Greece, Roumania, Constantinople.
- C4. Poland, Bohemia.
- D1. Germany.
- D2. Austria.
- D3. Russia in Europe.
- E. Africa (not included under B and C).
- F. North America.

For collective reports, Class 1 the different sub-groups will transmit according to the following scheme:—

Observations made at 0100.

Wavelengths ..	4,200	3,900	3,700	3,500
Times of Issue.				
0230	Group A1.	Group B1.	Group C1.	Group D1.
0245	Group A2.	Group B2.	Group C2.	Group D2.
0300	Group A3.	Group B3.	Group C3.	Group D3.
0315	—	Group B4.	Group C4.	—

Radio-communication and Meteorology

A similar procedure will be followed for observations at 1300, 1900. This permits 1½ hours as a minimum, for the collection of observations and the preparation of the coll message.

Collective reports, Class 2, are to be transmitted from four transmitting stations in Europe as follows:—

Group A.	Stavanger	Wavelength, 9500.
Group B.	Lyons	Wavelength, 15,500.
Group C.	Rome	Wavelength, 10,850.
Group D.	Nauen	Wavelength, 12,600.
Group E.	—	—
Group F.	Annapolis (?)	Wavelength, 17,000.

These reports will be transmitted simultaneously at 0400, 1600, 2200, by G.M.T.—i.e., three hours after the times of observation and forty-five minutes after the latest time for the transmission of Class 1 reports for the corresponding hour of observation. The punctual issue of these reports will depend on the time-table for reports being strictly adhered to.

It is seen that when this scheme is working it will be possible to make a synoptic chart for the area extending in longitude from 10° W. to the Ural Mountains, and in latitude from the Equator to the Arctic Circle; and to complete it within four hours of the time of observation. This should furnish all that is required for navigation of aeroplanes in the area concerned, and should also furnish the meteorologist in the position to give general forecasts for three days ahead at least on the majority of occasions, especially for those less critically situated than the British Isles.

There is one further development in which wireless telegraphy is going to be of the greatest assistance to meteorology. Great progress has been made in recording atmospheric conditions and the direction from which they come. Already it has proved possible with a single station with confidence that there was practically no risk of thunderstorms on a particular route, although thunderstorms were indicated in other directions in the region in which the station was situated. A direction finder for thunderstorms can now be made with a coil 5 ft. by 4 ft., rotated about a vertical axis until the position of maximum intensity is found. The sensitiveness of this detector used with mionics valves is remarkable, and it is a relatively inexpensive instrument. It is almost certain to prove an indispensable part of the meteorological equipment of every local meteorological centre. That it is achieved it will probably prove feasible to follow the storm weather. The use of atmospherics in meteorology is practised in the embryo stage at present; he would be a bold man who set to the developments which may come when these form part of collective information at the disposal of the headquarters expert.

A similar procedure will be followed for observations at 0700, 1300, 1900. This permits $1\frac{1}{2}$ hours as a minimum, for the national collection of observations and the preparation of the collective message.

Collective reports, Class 2, are to be transmitted from four main transmitting stations in Europe as follows:—

Group A.	Stavanger	Wavelength, 9500.
Group B.	Lyons	Wavelength, 15,500.
Group C.	Rome	Wavelength, 10,850.
Group D.	Nauen	Wavelength, 12,600.
Group E.	—	—
Group F.	Annapolis (?)	Wavelength, 17,000

These reports will be transmitted simultaneously at 0400, 1000, 1600, 2200, by G.M.T.—*i.e.*, three hours after the times of observation and forty-five minutes after the latest time for the transmission of the Class 1 reports for the corresponding hour of observation. The punctual issue of these reports will depend on the time-table for Class 1 reports being strictly adhered to.

It is seen that when this scheme is working it will be possible to make a synoptic chart for the area extending in longitude from Vancouver to the Ural Mountains, and in latitude from the Equator to the Arctic Circle; and to complete it within four hours of the time of observation. This should furnish all that is required meteorologically for navigation of airships in the area concerned, and should put the meteorologist in the position to give general forecasts for three or four days ahead at least on the majority of occasions, especially for areas less critically situated than the British Isles.

There is one further development in which wireless telegraphy is going to be of the greatest assistance to meteorology. Great progress has been made in recording atmospheric and the direction from which they come. Already it has proved possible with a single station to say with confidence that there was practically no risk of thunderstorms on a particular route, although thunderstorms were indicated in other directions in the region in which the station was situated. A wireless direction finder for thunderstorms can now be made with a coil about 5 ft. by 4 ft., rotated about a vertical axis until the position of minimum intensity is found. The sensitiveness of this detector used with thermionic valves is remarkable, and it is a relatively inexpensive instrument. It is almost certain to prove an indispensable part of the instrumental equipment of every local meteorological centre. When that it is achieved it will probably prove feasible to follow the path of each thunderstorm and to devise a method of advising airships and aeroplanes *en voyage* of the course to be taken to avoid thunderstorm weather. The use of atmospheric in meteorology is practically in the embryo stage at present; he would be a bold man who set limits to the developments which may come when these form part of the collective information at the disposal of the headquarters expert.

WIRELESS AND TIME

BY ARTHUR R. HINKS, M.A., F.R.S., Secretary of the Royal Geographical Society.

AT the outbreak of war there was in progress a new determination of the difference of longitude between Paris and Saint Petersburg, as it then was; or, more precisely, between Paris and the Imperial observatory of Pulkovo. To-day we know no more of that famous observatory than that it has been under the "direction" of two Bolshevik soldiers; that the recent fighting between the Reds and the forces of Denikin has swayed backwards and forwards over the hill on which the observatory stands, or stood; and that there is only too much reason to fear for the survival of what was the most renowned institution of its kind: the national observatory, whose first concern is with the very fundamentals of astronomy. The wireless determination of the Paris-Pulkovo longitude was an important step in that revision of the primary longitudes of Europe required by the ever-increasing demands of Geodesy, that is no longer content with the earth as a spheroid of revolution, but must examine afresh with all possible refinement the discordances between the astronomical and the geodetic, or between the wireless and the surveyed differences of longitude, in order to determine those anomalies of the vertical, that is, of the direction of gravity, that are essential to the construction of the "geoid."

During the years of war astronomers and surveyors have turned to less fundamental, but more imperative, needs. The escorts of armoured cars have lain out all night under arms in the deserts of Arabia, Egypt, and Mesopotamia, while astronomers with temporary commissions in the Royal Engineers have "counted the stars," or determined time and latitude, with time signals from the Eiffel Tower or, what amused them more, from Nauzen for the derivation of the longitude. Thanks to wireless, it is now, for the first time, possible to place the Hedjaz railway accurately on the map of Arabia; and the methods of desert reconnaissance survey under conditions of war have been wonderfully developed by the Survey of Egypt; while the longitudes of the surveys in Mesopotamia depend on the time signals from the central wireless station at Basra. Very little has been published as yet on the technical experiences of these survey parties, and perhaps there is not much to tell, for we know from the reports of Cav. De Filippi's expedition in the Karakorum in 1913 that the field determination of longitude by wireless offers no particular difficulty. Geographers will, however, be anxious to know more of the possibilities of valves worked with primary batteries, and of the use of growing trees as aerials in the manner developed by the United States Signal Service. The latter method appeals especially to the surveyor in the forests of the Amazon or the Congo. Dr. Hamilton Rice, on the Amazon, found at first much difficulty in hoisting his aerial in the forest. He has just returned to that river for a further tour of exploration and survey, and we may hope to learn much of the possibilities of turning the forest to good account in the new method.

The surveyor, who can hardly be expected to follow the rapid transformation of wireless ideas and their somewhat bewildering technique, would be grateful for a little dogmatic advice on such questions as the relative efficiency of tall aerials and coils, and the saving of weight to be carried which may be effected by the latter. When a single traveller, with no skilled assistance, can set up his wireless gear in a few minutes, then we shall have, indeed, the long-desired revolution in methods of desert survey, to which the excellent work of the French in the Sahara pointed the way, and the work of our surveyors in the Eastern warfare has doubtless contributed much.

There is an important point in these astronomical determinations of position that must not be overlooked: they are affected by any abnormalities in the direction of the vertical, of which we have spoken above. Owing partly to the attraction of visible masses above the sea level, but often much more to invisible excesses or defects of density below, the direction of gravity is displaced from the normal to the theoretical figure of revolution which is the "figure of the earth" to which all survey calculations are referred. In consequence of such abnormalities, the distance between two stations determined astronomically from their latitudes and longitudes will not agree very closely with the distance determined by the ordinary survey methods of base measurement and triangulation. In very mountainous regions the differences thus created between the two classes of measures, the geodetic and the astronomical, may amount to a considerable part of a minute of arc, or nautical mile; and a single astronomical point may be very visibly out of accordance with surrounding points determined by triangulation. Such discordances would play havoc with a large-scale cadastral survey, in which areas are all-important, and nothing can replace triangulation for work of this type. On the other hand, astronomical determinations are often easy just where triangulation is practically impossible, as in flat deserts. Hence we shall have inevitable discordances where the triangulation meets the desert survey by astronomical positions that wireless has so much improved. But this discordance is not all loss, for the information thus obtained will be essential in a general discussion of the abstruse problems of the real shape of the level surface, which are of the greatest scientific interest, though, perhaps, of not much practical importance at present.

So much for the use of time signals in land survey of the large scale. Their use in navigation has become a commonplace, and they must have done much to relieve the strain on the supply of chronometers caused by the great expansion of our Navy during the war, added to the serious destruction both in naval actions and in the sinking of merchant ships. As to the use of directional wireless in hydrographic surveys, it has a serious competitor in submarine sound ranging, and we may suspect that the latter, about which scarcely anything has been published, is the more accurate at present. There is, however, this consolation for the wireless enthusiast, that sound, with its insignificant speed of five seconds for a mile in air, and one second in water, is much more readily delayed or destroyed by local circumstance than is the almost infinitely rapid wireless wave, to which the future assuredly belongs.

A natural corollary of the extension of time signals is the use of "standard time" afloat, as well as on shore. But the introduction of

this reform was not made in the Navy without some hesitation, and will not be wholeheartedly adopted in the mercantile marine without some persuasion. We shall find it worth while, therefore, to give some space this year to the examination of a matter which is not quite so simple as it appears on the surface, and is of very great importance to the future of wireless intercommunication. The credit of the first effective move belongs to the distinguished hydrographer of the French Navy, Monsieur J. Renaud, who has published in the *Annuaire* of the *Bureau des Longitudes* for 1918 an excellent summary of the reasons which led to the employment of standard time in the French and Italian navies, and thus to the British Hydrographer's Conference of 1917.

"Although," says M. Renaud, "the ocean covers nearly three-quarters of the surface of the globe, the question of time has almost always been treated without reference to the life of the seafarer." Nearly all civilised countries have fixed by law the time shown on their public clocks, but the International Time Conference, which met at Paris in October, 1912, gave no attention at all to the question of the time at sea. Yet precise knowledge of the time of events recorded at sea is important, whether in public business or in scientific affairs, especially in meteorology. On land we have arrived by gradual steps, first, at the use of mean time instead of apparent solar time; then at the use of one uniform mean time throughout a country; and, finally, at the use in most countries of "standard time," based on that of the meridian of Greenwich, and differing from Greenwich mean time by an exact number of hours, with the ultimate intent that all clocks throughout the land surface of the world shall show the same minutes and seconds, and differ only in the hours. Meanwhile the sailor has continued in the primitive condition of keeping local apparent time, more or less, putting the ship's clock to this at noon, and keeping it to this setting until the next noon, though all the time the longitude is changing. Such was the rule, but by no means always the practice. Cross-channel services, or vessels on coasting voyages, would often keep the time of the shore; transatlantic passenger ships would make the large corrections needed in several parts each day, according to the captain's view of the convenience of his passengers or the requirements of the ship's routine. As the time was continually changing with the change of longitude, there was no particular inducement to keep it very accurately; and it is important to notice that the noon observation at sea gives the latitude, but not the time, except very roughly; and the instant of local noon is derived from the morning observation for time and longitude, combined with the dead reckoning of the ship.

It resulted from this process that the exact time of an event at sea could rarely be ascertained. It was recorded in hours and minutes of the ship's clock, with the position of the ship at the time, which data are insufficient. To convert the record into G.M.T. one must know either the longitude of the ship at noon when the clock was last adjusted, or the time at the place of record; and after the event these data were usually unobtainable. Moreover, there were many occasions in which this vagueness of time was inconvenient in the actual working of the ship: when, for example, it was required to take out from the Tide Tables the data required for entering port. Still more inconvenient was it when signals were made from ship to ship,

especially when two fast ships going east and west passed in the north Atlantic; and the great increase of intercommunication by wireless was the decisive factor in putting an end to all this uncertainty and risk of error.

The obvious reform was to introduce at sea the system of standard time, varying by exact hours from Greenwich Mean Time. This system is commonly, but unfortunately, known as "Zone Time": unfortunately, because a zone is the area included between two parallels of latitude, not that between two meridians of longitude. The French have an excellent word, "*fuseau*," meaning spindle, for such an area, and divide the world into "*fuseaux horaires*." We can avoid the word zone in speaking of Standard Time; but have nothing for it but to speak of an hour zone when we wish to describe the area in which one uniform hour is kept. The theory of hour zones is very simple. If Greenwich is to be the prime meridian, as is now universal, the zone of Greenwich time, or the zero zone, is bounded by the meridians $7\frac{1}{2}^{\circ}$ east and west of Greenwich; the zone of time one hour slow on Greenwich is included between the meridians $7\frac{1}{2}^{\circ}$ and $22\frac{1}{2}^{\circ}$ west, and so on round the world. In practice one modifies the zones a little as they approach the coasts, so as to conform to the standard times kept ashore, which sometimes for convenience, exceed the strict limits of the zones, as in the north of Norway, where the time of central Europe is kept, one hour fast of Greenwich, though the longitude is nearly 30° east. The French Hydrographer published an excellent *Planisphère des Fuseaux horaires* to show the limits of these zones of convenience, and they have since been adopted without change by the British, on the recommendation of the British Hydrographer's Conference in 1917.

But in one respect the British have found themselves obliged to differ from the French: in numbering the zones. The French number the hour zones eastward from 0 to 23. To find the Greenwich Mean Time corresponding to the standard time of Zone 8 one subtracts 8 hours; but in Zone 22 one must obviously add 24 hours before performing the subtraction, or the result will be a whole day wrong. Herein lies the one defect of the French system: it is not easy to provide for it giving infallibly the right day. The Zone 12 is divided into two parts by the 180th meridian, where the date should theoretically change; but in practice it has been found convenient to draw a "Date-line," which in places deviates considerably from this meridian. Through Bering Strait it is about 40 minutes of time east of the meridian, to preserve a uniform date for all Asia; and a little to the south it is nearly as much west, to keep the American date for the Aleutian Islands. South of the Equator it diverges half an hour east, to bring Fiji and Chatham Island within the region of the Old World date; and now that Samoa is to go under mandate to New Zealand, the line will presumably be altered, or Samoa will be a day behind her mandatory power.

The French method of numbering the zones did not, therefore, commend itself to the British conference; which was of the opinion that the description of the zone should give the actual correction required to reduce the Zone Time to Greenwich Mean Time *and date*. It was therefore resolved that the zones west of the zero zone should be described as Plus 1, Plus 2, up to Plus 12 for that part of Zone 12 lying east of the date-line (that is, the line described in the Admiralty

Sailing Directions based on the 180th meridian, on crossing which, from east or west, the date must be advanced or put back one day respectively; and that the zones east of the zero zone should be described as Minus 1, Minus 2, up to Minus 12 for that part of Zone 12 lying west of the date-line. By this simple improvement—with which, we are glad to know, Monsieur Renaud is personally in sympathy—the complexity of the date-line change is removed, and Zone Time can be referred infallibly to G.M.T.

It is important to note that the Zone Time kept at any moment by a ship is not necessarily the time of the zone in which she actually is. The change of the ship's clock must be a whole hour, and it will depend on circumstances when this change can most conveniently be made with regard for the ship's routine. Further, a ship may be keeping summer time (though the Conference expressed the opinion that there is no advantage in doing so at sea), and in that case the zone description will be one less than the true number of the zone. The whole essence of the reform is that the time shall differ a whole number of hours from G.M.T., and that the correction to reduce it to G.M.T.—that is, the zone description—shall be recorded with the time. If that is done, it matters nothing to the accuracy of the record whether a ship is keeping the time of the zone in which she actually is or that of any other zone which may be convenient.

The Conference recommended, further, that Zone Time should be used for the immediate future in registering the receipt and dispatch of all wireless telegraph, telegraph, and visual messages; but was nevertheless of opinion that the most convenient time to adopt for all records of and reference to time in all messages throughout the world would be Greenwich Mean Time, and expressed the hope that this proposal might as soon as possible be brought before the various nations and bodies concerned.

During the continuance of the war special rules were in force for time-keeping in the Navy; but in the spring of last year an Admiralty order was issued which brought into use the system described above. The Marine Department of the Board of Trade had already, a year before, prepared the way for its introduction into the mercantile service by the issue of their Memorandum on Time-keeping at Sea, accompanied by a Time Zone Chart; and there is every reason to hope that in the course of a few months the new system will be universal in the British service. To neglect it would be to throw away wilfully a great part of the convenience that might otherwise be gained by the rapid development of wireless time services throughout the world.

There remains the task of persuading recalcitrant people ashore to follow the lead now given them by the sea. It is no credit to the British Empire that Newfoundland, British Guiana, and British East Africa should be coloured yellow on the Time Zone Chart, along with Abyssinia and Arabia and other backward countries. Nor is it very satisfactory to find Nigeria, British India, other than Calcutta (which is yellow), South Australia, and New Zealand coloured purple, to show their half-hearted adoption of standard times involving odd half-hours. However much one may dislike the principle of "daylight saving," it may at least be used as an argument against those who spoil the beauty of the system by insisting on the odd half-hours.

INTERNATIONAL TIME AND WEATHER SIGNALS.

CURRENT ARRANGEMENTS.

BELOW are given particulars of the time and weather messages issued in different countries. Changes are in progress in the weather messages and the codes in which they are issued, but the following explanatory notes and specifications apply to the majority of those issued at present. The standard group is represented symbolically by

BBBDD FWS

Here BBB = barometer reduced to sea-level and corrected for gravity. If the barometer reading is given in inches, the initial 2 or 3 is usually omitted and the values given to the nearest hundredth. If it is expressed in millimetres and tenths, the initial 7 is omitted. If it is expressed in millibars and tenths the initial 9 or 10 is omitted.

Readings in millimetres can be expressed in millibars by adding $\frac{1}{3}$ —*e.g.*,
 $760 \text{ mm.} = 760 + \frac{1}{3} (760) = 760 + 253\cdot3 = 1013\cdot3 \text{ mb.}$

Similarly, readings in millibars can be expressed in millimetres by taking $\frac{3}{4}$ of the value—*e.g.*, $1,000 \text{ mb.} = \frac{3}{4} (1000) = 750 \text{ mm.}$

DD = direction of wind according to the following code unless otherwise specified :—

02 = N.N.E.	18 = S.S.W.
04 = N.E.	20 = S.W.
06 = E.N.E.	22 = W.S.W.
08 = E.	24 = W.
10 = E.S.E.	26 = W.N.W.
12 = S.E.	28 = N.W.
14 = S.S.E.	30 = N.N.W.
16 = S.	32 = N.

For calm the figures 00 are used.

F = Force of wind on Beaufort scale specified on pp. 1048 and 1049.

For forces greater than 9 a special note is usually added at the end of a message.

W = Weather by following code :—

- 0 = fine, cloudless.
- 1 = less than half sky covered with cloud.
- 2 = about half sky covered with cloud.
- 3 = about three-quarters of sky covered with cloud.
- 4 = overcast.
- 5 = rain.
- 6 = snow.
- 7 = mist (not *wet fog*, but fog less thick than for 8).
- 8 = fog.
- 9 = thunderstorm.

S = state of the surface of the sea :—

- 0 = calm—glassy.
- 1 = very smooth—slightly rippled.
- 2 = smooth—rippled.
- 3 = slight—rocks buoy.
- 4 = moderate—furrowed—choppy.
- 5 = rather rough—much furrowed.
- 6 = rough—deeply furrowed.
- 7 = high—rollers with steep fronts.
- 8 = very high—rollers with steep fronts.
- 9 = phenomenal—precipitous.

Fuller reports include also the temperature TT, the barometric characteristic c and the tendency bb. A conversion table from degrees Absolute to degrees Fahrenheit and *vice versa* is given in Table I. Degrees Centigrade are obtained from degrees Absolute by subtracting 273.

For reports of visibility V the following is the standard telegraphic code :—
Code figure.

0	=	objects not visible at 50 metres.			
1	=	objects visible at 50 metres but not at 200 metres.			
2	=	" " 200 " " 500 "			
3	=	" " 500 " " 1,000 "			
4	=	" " 1,000 " " 2,000 "			
5	=	" " 2,000 " " 4,000 "			
6	=	" " 4,000 " " 7,000 "			
7	=	" " 7,000 " " 12,000 "			
8	=	" " 12,000 " " 30,000 "			
9	=	" " 30,000 and exceptionally clear air.			

For reports of barometric tendency the characteristic c has the following significance for the period of 3 hours preceding the time of observation :—

	<i>Old Scale.</i>	<i>New Scale.</i>
0	= barometer steady.	steady or rising.
1	= " unsteady.	rising, then steady.
2	= " rising continuously.	rising, then falling.
3	= " falling continuously.	falling or steady, then rising.
4	= " falling, then rising.	unsteady, but rising.
5	= " steady, then rising.	falling.
6	= " steady, then falling.	falling, then steady.
7	= " falling, then steady.	falling, then rising.
8	= " rising, then steady	steady or rising, then falling.
	or falling	
9	= " sudden rise with marked change of wind and weather.	unsteady, but falling.



In the new scale the first five figures are used if the barometer has on the whole risen in the last three hours.

The amount of change or tendency b is expressed in $\frac{1}{4}$ millibars in British reports, in half millimetres where millimetres are used for barometer. [For negative values of the tendency 50 used to be added to the actual numerical value of bb; where millimetres were used negative values used to be indicated by adding 50 to the wind direction DD.]

For reports of humidity H the following scale is used :—

0	= 95 — 100 per cent.	5	= 50 — 59 per cent.
9	= 90 — 94 "	4	= 40 — 49 "
8	= 80 — 89 "	3	= 30 — 39 "
7	= 70 — 79 "	2	= 20 — 29 "
6	= 60 — 69 "	1	= 10 — 19 "




TABLE SHOWING THE SCALE FOR PRESENT WEATHER (ww).

	0	1	2	3	4	5	6	7	8	9
0	bc—	bc	bc+	bcv	bc⊕	bc/f	bc/r	bc/s	bcrl	bc/tlr
1	co—	co	co+	cov	co	co/f	co/r	co/s	cotl	co/tlr
2	fb	fo	ifb	ifo	fb—	fo—	ffb	ffo	fb+	fo+
3	pr _i	ph _i	prs _i	ps _i	PR—	PR	PR+	PH	PRS	PS
4	d _i	d _i d _i	d _i +	d—	d	dd	d+	D—	D	DD
5	r _i	r _i r _i	r _i +	r—	r	rr	r+	R—	R	RR
6	s _i	s _i s _i	s _i +	s—	s	ss	s+	S—	S	SS
7	rs _i	rs _i rs _i	rs _i +	rs—	rs	rsrs	rs+	RS—	RS	RSRS
8	h _i (r _i)	rh _i rh _i	h _i (r _i)+	h(r)—	h(r)	rh rh	h(r)+	H(R)—	H(R)	RHRH
9	tlr _i	tlrh _i	tlr	tlrh	TLR	TLRH	TLR 	TLRH 	kQ	kQh

A "solidus" means that the weather denoted by the letters preceding it is the actual weather at the time, and that it followed conditions denoted by the letter or letters after the "solidus." Thus, bc/r means "fair weather after rain."

In the table the Beaufort letters have their usual significance, but a suffix _i means "slight," and a capital means "heavy"; i=intermittent. A letter repeated denotes continuity: r_is_i=slight sleet; RR=continuous heavy rain; kQ=line squall (i.e., very heavy squalls, with change of wind direction and fall of temperature).

TABLE SHOWING THE SCALE FOR PAST WEATHER (WW).

	0	1	2	3	4	5	6	7	8	9
0	b	bc(H)	bc(L)	bc(LH)	c(H)	c(L)	c(LH)	co(H)	co(L)	co(LH)
1	o(H)	o(L)	o(LH)	O(LH)	bo(LH)	oif	o2f	o3f	o4,5f	o,6,7,8f
2	1f	2f	3f	4f,5f	6,7,8f	1fe	2fe	3fe	4,5fe	6,7,8fe
3	e	v	z	w	x	V	~		⊕	⊞
4	⊙	⊙		q		g	u	t	l	tl
5	pr _i	pr	pR	ph _i or rh _i	ph or rh	pH or RH	prs _i	prs	pRS	ps _i
6	ps	pS	d _i	d	D	r _i	r	R	r _i h _i	rh
7	RH	r _i s _i	rs	RS	s _i	s	S	d _i d _i	dd	DD
8	r _i s _i	rr	RR	r _i s _i h _i	rrh	RRH	r _i s _i r _i s _i	rsrs	RSRS	s _i s _i
9	ss	SS	tlr _i	tlr	TLR	tlrh _i	tlrh	TLRH	Line Q	—

In the table a letter repeated denotes continuity. Thus: rr=continuous rain, while r=rain at times; r_is_ir_is_i=continuous slight sleet.

The letters in brackets (L) and (H) refer to the type of cloud. Thus: c(H) means cloudy with medium or high cloud; c(L) means cloudy with low cloud; c(LH) means cloudy with mixed cloud.

The scale for cloud form is as follows:—

- | | |
|--------------------|--------------------------------|
| 1 = Cirrus. | 6 = Strato-cumulus. |
| 2 = Cirro-stratus. | 7 = Nimbus. |
| 3 = Cirro-cumulus. | 8 = Cumulus or fracto-cumulus. |
| 4 = Alto-cumulus. | 9 = Cumulo-nimbus. |
| 5 = Alto-stratus. | 0 = Stratus. |

The Fog Scale is as follows:—

- | | |
|-------------------------------------|--------------------------------------|
| 8f=objects not visible at 25 yards. | 4f=objects not visible at 500 yards. |
| 7f= " " " 50 " | 3f= " " " 2,000 " |
| 6f= " " " 100 " | 2f= " " " 4 miles. |
| 5f= " " " 200 " | 1f= " " " 12 " |

SPECIFICATION OF THE BEAUFORT SCALE WITH

Beaufort Number.	Admiral Beaufort's General Description of Wind.	Admiral Beaufort's Specification, 1805.	Description of Wind.	Mode of Estimating aboard Sailing Vessels.		
0	Calm	Calm	—	—		
1	Light air ..	Just sufficient to give steerage way.	Light breeze	Sufficient wind for working ship.		
2	Slight breeze	That in which a well-conditioned man-of-war, with all sail set and "clean full," would go in smooth water from			Moderate breeze	Forces most advantageous for sailing with leading wind and all sail drawing.
3	Gentle breeze						1 to 2 knots.
4	Moderate breeze	3 to 4 knots.	Moderate breeze	Forces most advantageous for sailing with leading wind and all sail drawing.		
5	Fresh breeze	5 to 6 knots.				
6	Strong breeze	Royals, etc.	Strong wind	Reduction of sail necessary with leading wind.		
7	Moderate gale (<i>High Wind</i>)	Single-reefed topsails or top-gallant sails.				
8	Fresh gale .. (<i>Gale</i>)	Double-reefed topsails, jib, etc.				
9	Strong gale ..	Triple-reefed topsails, etc.	Gale forces	Considerable reduction of sail necessary even with wind quartering.		
10	Whole gale ..	Close-reefed topsails and courses.				
11	Storm ..	That with which she could just carry in chase "full and by."	Storm forces	Close reefed sail running, or hove to under storm sail.		
12	Hurricane ..	That which would reduce her to storm stay-sails.				
		That which no canvas could withstand.	Hurricane ..	No sail can stand even when running.		

* It has been decided that for statistical purposes winds of force less than 8 shall not be counted as gales, and to avoid the ambiguity implied by the use of the term "moderate gale" for force 7 the Beaufort description has been modified by the substitution of the descriptions in italics for forces 7 and 8.

EQUIVALENTS OF THE NUMBERS OF THE SCALE.

Beaufort Number.	Specification of Beaufort Scale.		Mean wind force in lb. per sq. ft. at standard density.	Equivalent velocity in miles per hour.	Limits of Velocity.
	For Coast Use.	For Use on Land.			
0	Calm	Calm; smoke rises vertically.	0	0	Less than 1
1	Fishing smack * just has steerage way.	Direction of wind shown by smoke drift, but not by wind vanes.	·01	2	1-3
2	Wind fills the sails of smacks, which then move at about 1-2 miles per hour.	Wind felt on face; leaves rustle; ordinary vane moved by wind.	·03	5	4-7
3	Smacks begin to careen, and travel about 3-4 miles per hour.	Leaves and small twigs in constant motion; wind extends light flag.	·28	10	8-12
4	Good working breeze; smacks carry all canvas, with good list.	Raises dust and loose paper; small branches are moved.	·67	15	12-18
5	Smacks shorten sail . .	Small trees in leaf begin to sway; crested wavelets form on inland waters.	1·31	21	19-24
6	Smacks have double reef in main sail. Care required when fishing.	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	2·3	27	25-31
7	Smacks remain in harbour, and those at sea lie to.	Whole trees in motion; inconvenience felt when walking against wind.	3·6	35	32-38
8	All smacks make for harbour, if near.	Breaks twigs off trees; generally impedes progress.	5·4	42	39-46
9	—	Slight structural damage occurs (chimney pots and slates removed).	7·7	50	47-54
10	—	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	10·5	59	55-63
11	—	Very rarely experienced; accompanied by widespread damage.	14·0	68	64-75
12	—	—	Above 17·0	Above 75	Above 75

* The fishing smack in this column may be taken as representing a trawler of average type and trim. For larger or smaller boats and for special circumstances allowance must be made.

TABLE I.—TEMPERATURE. *Degrees Absolute to Degrees Fahrenheit.*
The equations are $A = 273 + \frac{5}{9} (F - 32)$, $F = 32 + \frac{9}{5} (A - 273)$.

Degrees Abso- lute.	0	1	2	3	4	5	6	7	8	9
Degrees Fahrenheit.										
250	- 9.4	- 9.2	- 9.0	- 8.9	- 8.7	- 8.5	- 8.3	- 8.1	- 8.0	- 7.8
251	- 7.6	- 7.4	- 7.2	- 7.1	- 6.9	- 6.7	- 6.5	- 6.3	- 6.2	- 6.0
252	- 5.8	- 5.6	- 5.4	- 5.3	- 5.1	- 4.9	- 4.7	- 4.5	- 4.4	- 4.2
253	- 4.0	- 3.8	- 3.6	- 3.5	- 3.3	- 3.1	- 2.9	- 2.7	- 2.6	- 2.4
254	- 2.2	- 2.0	- 1.8	- 1.7	- 1.5	- 1.3	- 1.1	- 0.9	- 0.8	- 0.6
255	+ 0.4	+ 0.2	+ 0.0	+ 0.1	+ 0.3	+ 0.5	+ 0.7	+ 0.9	+ 1.0	+ 1.2
256	+ 1.4	+ 1.6	+ 1.8	+ 1.9	+ 2.1	+ 2.3	+ 2.5	+ 2.7	+ 2.8	+ 3.0
257	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.6	4.8
258	5.0	5.2	5.4	5.5	5.7	5.9	6.1	6.3	6.4	6.6
259	6.8	7.0	7.2	7.3	7.5	7.7	7.9	8.1	8.2	8.4
260	8.6	8.8	9.0	9.1	9.3	9.5	9.7	9.9	10.0	10.2
261	10.4	10.6	10.8	10.9	11.1	11.3	11.5	11.7	11.8	12.0
262	12.2	12.4	12.6	12.7	12.9	13.1	13.3	13.5	13.6	13.8
263	14.0	14.2	14.4	14.5	14.7	14.9	15.1	15.3	15.4	15.6
264	15.8	16.0	16.2	16.3	16.5	16.7	16.9	17.1	17.2	17.4
265	17.6	17.8	18.0	18.1	18.3	18.5	18.7	18.9	19.0	19.2
266	19.4	19.6	19.8	19.9	20.1	20.3	20.5	20.7	20.8	21.0
267	21.2	21.4	21.6	21.7	21.9	22.1	22.3	22.5	22.6	22.8
268	23.0	23.2	23.4	23.5	23.7	23.9	24.1	24.3	24.4	24.6
269	24.8	25.0	25.2	25.3	25.5	25.7	25.9	26.1	26.2	26.4
270	26.6	26.8	27.0	27.1	27.3	27.5	27.7	27.9	28.0	28.2
271	28.4	28.6	28.8	28.9	29.1	29.3	29.5	29.7	29.8	30.0
272	30.2	30.4	30.6	30.7	30.9	31.1	31.3	31.5	31.6	31.8
273	32.0	32.2	32.4	32.5	32.7	32.9	33.1	33.3	33.4	33.6
274	33.8	34.0	34.2	34.3	34.5	34.7	34.9	35.1	35.2	35.4
275	35.6	35.8	36.0	36.1	36.3	36.5	36.7	36.9	37.0	37.2
276	37.4	37.6	37.8	37.9	38.1	38.3	38.5	38.7	38.8	39.0
277	39.2	39.4	39.6	39.7	39.9	40.1	40.3	40.5	40.6	40.8
278	41.0	41.2	41.4	41.5	41.7	41.9	42.1	42.3	42.4	42.6
279	42.8	43.0	43.2	43.3	43.5	43.7	43.9	44.1	44.2	44.4
280	44.6	44.8	45.0	45.1	45.3	45.5	45.7	45.9	46.0	46.2
281	46.4	46.6	46.8	46.9	47.1	47.3	47.5	47.7	47.8	48.0
282	48.2	48.4	48.6	48.7	48.9	49.1	49.3	49.5	49.6	49.8
283	50.0	50.2	50.4	50.5	50.7	50.9	51.1	51.3	51.4	51.6
284	51.8	52.0	52.2	52.3	52.5	52.7	52.9	53.1	53.2	53.4
285	53.6	53.8	54.0	54.1	54.3	54.5	54.7	54.9	55.0	55.2
286	55.4	55.6	55.8	55.9	56.1	56.3	56.5	56.7	56.8	57.0
287	57.2	57.4	57.6	57.7	57.9	58.1	58.3	58.5	58.6	58.8
288	59.0	59.2	59.4	59.5	59.7	59.9	60.1	60.3	60.4	60.6
289	60.8	61.0	61.2	61.3	61.5	61.7	61.9	62.1	62.2	62.4
290	62.6	62.8	63.0	63.1	63.3	63.5	63.7	63.9	64.0	64.2
291	64.4	64.6	64.8	64.9	65.1	65.3	65.5	65.7	65.8	66.0
292	66.2	66.4	66.6	66.7	66.9	67.1	67.3	67.5	67.6	67.8
293	68.0	68.2	68.4	68.5	68.7	68.9	69.1	69.3	69.4	69.6
294	69.8	70.0	70.2	70.3	70.5	70.7	70.9	71.1	71.2	71.4
295	71.6	71.8	72.0	72.1	72.3	72.5	72.7	72.9	73.0	73.2
296	73.4	73.6	73.8	73.9	74.1	74.3	74.5	74.7	74.8	75.0
297	75.2	75.4	75.6	75.7	75.9	76.1	76.3	76.5	76.6	76.8
298	77.0	77.2	77.4	77.5	77.7	77.9	78.1	78.3	78.4	78.6
299	78.8	79.0	79.2	79.3	79.5	79.7	79.9	80.1	80.2	80.4
300	80.6	80.8	81.0	81.1	81.3	81.5	81.7	81.9	82.0	82.2
301	82.4	82.6	82.8	82.9	83.1	83.3	83.5	83.7	83.8	84.0
302	84.2	84.4	84.6	84.7	84.9	85.1	85.3	85.5	85.6	85.8
303	86.0	86.2	86.4	86.5	86.7	86.9	87.1	87.3	87.4	87.6
304	87.8	88.0	88.2	88.3	88.5	88.7	88.9	89.1	89.2	89.4
305	89.6	89.8	90.0	90.1	90.3	90.5	90.7	90.9	91.0	91.2
306	91.4	91.6	91.8	91.9	92.1	92.3	92.5	92.7	92.8	93.0
307	93.2	93.4	93.6	93.7	93.9	94.1	94.3	94.5	94.6	94.8
308	95.0	95.2	95.4	95.5	95.7	95.9	96.1	96.3	96.4	96.6
309	96.8	97.0	97.2	97.3	97.5	97.7	97.9	98.1	98.2	98.4
310	98.6	98.8	99.0	99.1	99.3	99.5	99.7	99.9	100.0	100.2

International Time and Weather Signals

The following table enables inches of mercury to be put into
and vice versa:—

TABLE II.—PRESSURE.
Equivalents in Millibars of Inches of Mercury at 32° F. Lat. 45°

11.—PRESSURE. Equivalents in Millibars of Inches of Mercury at 32° F. Lat. 45°.										
Inches.	0	1	2	3	4	5	6	7	8	9
Millibars.										
27.0	914.3	914.6	915.0	915.3	915.7	916.0	916.3	916.7	917.1	917.5
27.1	917.7	918.0	918.4	918.7	919.0	919.4	919.7	920.1	920.5	920.9
27.2	921.1	921.4	921.8	922.1	922.4	922.8	923.1	923.4	923.8	924.2
27.3	924.5	924.8	925.1	925.5	925.8	926.2	926.5	926.8	927.2	927.6
27.4	927.9	928.2	928.5	928.9	929.2	929.5	929.9	930.2	930.6	931.0
27.5	931.2	931.6	931.9	932.3	932.6	932.9	933.3	933.6	934.0	934.4
27.6	934.6	935.0	935.3	935.6	936.0	936.3	936.7	937.0	937.4	937.8
27.7	938.0	938.3	938.7	939.0	939.4	939.7	940.0	940.4	940.7	941.1
27.8	941.4	941.7	942.1	942.4	942.8	943.1	943.4	943.8	944.1	944.5
27.9	944.8	945.1	945.5	945.8	946.1	946.5	946.8	947.2	947.5	947.9
28.0	948.2	948.5	948.8	949.2	949.5	949.9	950.2	950.5	950.9	951.3
28.1	951.6	951.9	952.2	952.6	952.9	953.2	953.6	953.9	954.3	954.7
28.2	955.9	956.2	956.5	956.9	957.2	957.6	957.9	958.3	958.6	959.0
28.3	959.3	959.7	959.9	960.3	960.7	961.0	961.4	961.7	962.1	962.5
28.4	961.7	962.1	962.4	962.7	963.1	963.4	963.7	964.1	964.4	964.8
28.5	966.5	966.8	967.1	967.5	967.8	968.2	968.5	968.9	969.2	969.6
28.6	969.5	969.8	970.2	970.5	970.9	971.2	971.6	971.9	972.3	972.7
28.7	972.7	973.0	973.4	973.7	974.1	974.4	974.8	975.1	975.5	975.9
28.8	975.3	975.6	975.9	976.3	976.6	977.0	977.3	977.7	978.0	978.4
28.9	978.6	979.0	979.3	979.7	980.0	980.4	980.7	981.1	981.4	981.8
29.0	982.0	982.4	982.7	983.0	983.4	983.7	984.1	984.4	984.8	985.2
29.1	985.4	985.8	986.1	986.5	986.8	987.2	987.5	987.9	988.3	988.6
29.2	988.8	989.1	989.5	989.8	990.2	990.5	990.9	991.2	991.6	992.0
29.3	992.2	992.5	992.9	993.2	993.6	993.9	994.3	994.6	995.0	995.4
29.4	995.6	995.9	996.3	996.6	997.0	997.3	997.7	998.0	998.4	998.8
29.5	999.0	999.3	999.6	1000.0	1000.3	1000.7	1001.0	1001.4	1001.7	1002.1
29.6	1002.4	1002.7	1003.0	1003.4	1003.7	1004.0	1004.4	1004.7	1005.1	1005.4
29.7	1005.7	1006.1	1006.4	1006.8	1007.1	1007.4	1007.8	1008.1	1008.5	1008.9
29.8	1009.1	1009.5	1009.8	1010.1	1010.5	1010.8	1011.2	1011.5	1011.9	1012.3
29.9	1012.5	1012.8	1013.2	1013.5	1013.9	1014.2	1014.5	1014.9	1015.3	1015.7
30.0	1015.9	1016.2	1016.6	1016.9	1017.3	1017.6	1017.9	1018.3	1018.6	1019.0
30.1	1019.7	1019.9	1020.0	1020.3	1020.6	1021.0	1021.3	1021.7	1022.0	1022.4
30.2	1022.7	1023.0	1023.3	1023.7	1024.0	1024.4	1024.7	1025.0	1025.4	1025.7
30.3	1026.1	1026.4	1026.7	1027.1	1027.4	1027.7	1028.1	1028.4	1028.8	1029.1
30.4	1029.4	1029.8	1030.1	1030.5	1030.8	1031.2	1031.5	1031.8	1032.2	1032.5
30.5	1032.8	1033.2	1033.5	1033.8	1034.2	1034.5	1034.9	1035.2	1035.6	1035.9
30.6	1036.2	1036.6	1036.9	1037.2	1037.6	1037.9	1038.3	1038.6	1039.0	1039.3
30.7	1039.6	1039.9	1040.3	1040.6	1041.0	1041.3	1041.7	1042.0	1042.4	1042.7
30.8	1043.0	1043.3	1043.7	1044.0	1044.4	1044.7	1045.0	1045.4	1045.7	1046.1
30.9	1046.4	1046.7	1047.1	1047.4	1047.7	1048.1	1048.4	1048.8	1049.1	1049.5
31.0	1049.8	1050.1	1050.4	1050.8	1051.1	1051.5	1051.8	1052.2	1052.5	1052.9
31.1	1053.1	1053.5	1053.8	1054.2	1054.5	1054.9	1055.2	1055.6	1055.9	1056.3
31.2	1056.5	1056.9	1057.2	1057.6	1057.9	1058.3	1058.6	1059.0	1059.3	1059.7
31.3	1059.9	1060.3	1060.6	1061.0	1061.3	1061.7	1062.0	1062.4	1062.7	1063.1
31.4	1063.3	1063.6	1064.0	1064.3	1064.7	1065.0	1065.4	1065.7	1066.1	1066.5
Thousandths of an Inch.										
Inch	Millibars.	.001	.002	.003	.004	.005	.006	.007	.008	.009
Equations may be written:— 1 mercury-inch = 33.6632 millibars. 1 mercury-inch = 1.01325 millibars. 1000 millibars = 1 bar = 29.3366 cm. 1 inch = 2.54000 cm.										

density of mercury = 13.6 g/cm³
 1 inch = 2.54 cm
 1000 millibars = 1 bar = 10⁵ Pa
 Equations may be written as:
 $\Delta T = 980.617 \text{ } ^\circ\text{C}/\text{sec}^{-1}$
 at normal freezing point of mercury
 $\Delta T = 29.5306 \text{ } ^\circ\text{C}/\text{sec}^{-1}$

The following table enables inches of mercury to be put into millibars and vice versa :—

TABLE II.—PRESSURE.
Equivalents in Millibars of Inches of Mercury at 32° F. Lat. 45°.

Inches.	0	1	2	3	4	5	6	7	8	9
	Millibars.									
27·0	914·3	914·6	915·0	915·3	915·7	916·0	916·3	916·7	917·0	917·4
27·1	917·7	918·0	918·4	918·7	919·0	919·4	919·7	920·1	920·4	920·7
27·2	921·1	921·4	921·8	922·1	922·4	922·8	923·1	923·4	923·8	924·1
27·3	924·5	924·8	925·1	925·5	925·8	926·2	926·5	926·8	927·2	927·5
27·4	927·9	928·2	928·5	928·9	929·2	929·5	929·9	930·2	930·6	930·9
27·5	931·2	931·6	931·9	932·3	932·6	932·9	933·3	933·6	933·9	934·3
27·6	934·6	935·0	935·3	935·6	936·0	936·3	936·7	937·0	937·3	937·7
27·7	938·0	938·3	938·7	939·0	939·4	939·7	940·0	940·4	940·7	941·1
27·8	941·4	941·7	942·1	942·4	942·8	943·1	943·4	943·8	944·1	944·4
27·9	944·8	945·1	945·5	945·8	946·1	946·5	946·8	947·2	947·5	947·8
28·0	948·2	948·5	948·8	949·2	949·5	949·9	950·2	950·5	950·9	951·2
28·1	951·6	951·9	952·2	952·6	952·9	953·2	953·6	953·9	954·3	954·6
28·2	954·9	955·3	955·6	956·0	956·3	956·6	957·0	957·3	957·7	958·0
28·3	958·3	958·7	959·0	959·3	959·7	960·0	960·4	960·7	961·0	961·4
28·4	961·7	962·1	962·4	962·7	963·1	963·4	963·7	964·1	964·4	964·8
28·5	965·1	965·4	965·8	966·1	966·5	966·8	967·1	967·5	967·8	968·1
28·6	968·5	968·8	969·2	969·5	969·8	970·2	970·5	970·9	971·2	971·5
28·7	971·9	972·2	972·6	972·9	973·2	973·6	973·9	974·2	974·6	974·9
28·8	975·3	975·6	975·9	976·3	976·6	977·0	977·3	977·6	978·0	978·3
28·9	978·6	979·0	979·3	979·7	980·0	980·3	980·7	981·0	981·4	981·7
29·0	982·0	982·4	982·7	983·0	983·4	983·7	984·1	984·4	984·7	985·1
29·1	985·4	985·8	986·1	986·4	986·8	987·1	987·5	987·8	988·1	988·5
29·2	988·8	989·1	989·5	989·8	990·2	990·5	990·8	991·2	991·5	991·9
29·3	992·2	992·5	992·9	993·2	993·5	993·9	994·2	994·6	994·9	995·2
29·4	995·6	995·9	996·3	996·6	996·9	997·3	997·6	997·9	998·3	998·6
29·5	999·0	999·3	999·6	1000·0	1000·3	1000·7	1001·0	1001·3	1001·7	1002·0
29·6	1002·4	1002·7	1003·0	1003·4	1003·7	1004·0	1004·4	1004·7	1005·1	1005·4
29·7	1005·7	1006·1	1006·4	1006·8	1007·1	1007·4	1007·8	1008·1	1008·4	1008·8
29·8	1009·1	1009·5	1009·8	1010·1	1010·5	1010·8	1011·2	1011·5	1011·8	1012·2
29·9	1012·5	1012·8	1013·2	1013·5	1013·9	1014·2	1014·5	1014·9	1015·2	1015·6
30·0	1015·9	1016·2	1016·6	1016·9	1017·3	1017·6	1017·9	1018·3	1018·6	1018·9
30·1	1019·3	1019·6	1020·0	1020·3	1020·6	1021·0	1021·3	1021·7	1022·0	1022·3
30·2	1022·7	1023·0	1023·3	1023·7	1024·0	1024·4	1024·7	1025·0	1025·4	1025·7
30·3	1026·1	1026·4	1026·7	1027·1	1027·4	1027·7	1028·1	1028·4	1028·8	1029·1
30·4	1029·4	1029·8	1030·1	1030·5	1030·8	1031·1	1031·5	1031·8	1032·2	1032·5
30·5	1032·8	1033·2	1033·5	1033·8	1034·2	1034·5	1034·9	1035·2	1035·5	1035·9
30·6	1036·2	1036·6	1036·9	1037·2	1037·6	1037·9	1038·2	1038·6	1038·9	1039·3
30·7	1039·6	1039·9	1040·3	1040·6	1041·0	1041·3	1041·6	1042·0	1042·3	1042·6
30·8	1043·0	1043·3	1043·7	1044·0	1044·3	1044·7	1045·0	1045·4	1045·7	1046·0
30·9	1046·4	1046·7	1047·1	1047·4	1047·7	1048·1	1048·4	1048·7	1049·1	1049·4
31·0	1049·8	1050·1	1050·4	1050·8	1051·1	1051·5	1051·8	1052·1	1052·5	1052·8
31·1	1053·1	1053·5	1053·8	1054·2	1054·5	1054·8	1055·2	1055·5	1055·9	1056·2
31·2	1056·5	1056·9	1057·2	1057·5	1057·9	1058·2	1058·6	1058·9	1059·2	1059·6
31·3	1059·9	1060·3	1060·6	1060·9	1061·3	1061·6	1062·0	1062·3	1062·6	1063·0
31·4	1063·3	1063·6	1064·0	1064·3	1064·7	1065·0	1065·3	1065·7	1066·0	1066·4

Thousandths of an Inch.

Inch	·001	·002	·003	·004	·005	·006	·007	·008	·009
Millibars.	·0	·1	·1	·1	·2	·2	·2	·3	·3

For brevity, the fundamental equations may be written:—

$$g_{45} = 980 \cdot 617 \text{ c.m./sec}^2,$$

density of mercury at normal freezing-point of water = 13·5955

1 mercury-inch = 33·8632 millibars, 1 mercury millimetre = 1·33320 millibars.

1000 millibars = 1 bar = 29·5306 mercury-inches = 750·076 mercury millimetres, using

1 inch = 2·54000 cm.

TABLE II (A).

Relation between inches and millimetres for comparison of readings of barometers graduated in these units.

In.	Mm.	In.	Mm.	In.	Mm.	In.	Mm.
27.0	685.8	28.0	711.2	29.0	736.6	30.0	762.0
27.2	690.9	28.2	716.3	29.2	741.7	30.2	767.1
27.4	696.0	28.4	721.4	29.4	746.8	30.4	772.2
27.6	701.0	28.6	726.4	29.6	751.8	30.6	777.2
27.8	706.1	28.8	731.5	29.8	756.9	30.8	782.3

NOTE.—(1) The table is based on the legal relation 1 in. = 2.5400 cm., which agrees very closely indeed with the best experimental comparisons.

(2) As millimetre barometers have the same standard temperature 0° C. for the brass scale and for the mercury, while inch barometers have a standard 32° F. for the mercury and 60° F. for the brass scale, the readings require correction for temperature by appropriate tables before the comparison can be made.

ARGENTINA

The Naval Observatory at Darsena Norte, situated on the northern entrance to the Port of Buenos Ayres, sends out, through the radio station located there, signals once daily at 10 p.m. (0200 G.M.T.) (Sundays and holidays excepted), on a wavelength of 800 metres. Their method of transmission consists of the sending of a series of five groups of dashes with a dot at each minute.

The method of transmission is as follows:—

- (a) from 1.55'.00" to 1.55'.50" (Greenwich a.m. mean time) a warning signal consisting of an unbroken series of dashes;
- at 1.56'.00" a dot representing the 1st time-signal.
- (b) from 1.56'.15" to 1.56'.50" an unbroken series of dashes;
- at 1.57'.00" a dot representing the 2nd time-signal.
- (c) from 1.57'.20" to 1.57'.50" an unbroken series of dashes;
- at 1.58'.00" a dot representing the 3rd time-signal.
- (d) from 1.58'.25" to 1.58'.50" an unbroken series of dashes;
- at 1.59'.00" a dot representing the 4th time-signal.
- (e) from 1.59'.30" to 1.59'.50" an unbroken series of dashes;
- at 2.00'.00" a dot representing the 5th and last time-signal.

Time-Signals.

	1st	2nd	3rd	4th	5th	Greenwich time.
1st	1.56'.00"
2nd	1.57'.00"
3rd	1.58'.00"
4th	1.59'.00"
5th	2.00'.00"

Duration of dot = $\frac{1}{4}$ second.

International Time and Weather Signals

AUSTRALASIA

Time signals are transmitted by the following stations:—
Adelaide Radio .. At 12.30 a.m. and p.m. Melbourne Time (1430 G.M.T.), international time-signals Wavelength 600.

Melbourne Radio .. At noon and midnight (Sundays excepted) standard time (0157-0200 and 1357-1400) international time-signals being used. 600 m.

Perth Radio .. At 9 a.m. and p.m. on 600 metres wavelength (2300 and 1100 G.M.T.). Wavelength 600 metres.

Ocean forecasts are transmitted by the following stations at specified (Melbourne time):—

Perth, 11 p.m. (1300 G.M.T.).

Adelaide, 9.30 p.m. (1130 G.M.T.).

Brisbane, 10 p.m. (1200 G.M.T.).

Melbourne, 9 p.m. (1100 G.M.T.).

Sydney, 8.30 a.m. and p.m. (2230 and 1030 G.M.T.).

Other stations repeat as necessary.

At present an official Ocean Forecast is transmitted daily Central Weather Bureau, Melbourne, to all Radio Stations in Australia, Port Moresby (New Guinea), and it is preceded by a specific statement of sea conditions existing at 9 a.m. around Australia, and sea disturbances any part of the coast. This information can be obtained by vessel request. When weather conditions are severe storm warnings are broadcast by the Shore Stations, and vessels receiving the warning requested to communicate them to passing shipping by means of code.

Each of the principal radio stations is supplied with a barometer for the purpose of giving information, so that if a shipmaster desires he may by asking the operator in charge. Daily weather reports (barometer state of wind, weather and sea) are received at the Meteorological Bureau, Melbourne, from shipmasters whenever their vessels are in Australian waters.

The restrictions which were placed on wireless messages during the resumption of radio weather reports from ships when 300 miles or more from the Australian coastline—many messages are now being received.

NEW ZEALAND

New Zealand stations send out weather forecasts on 600-metre length, Mondays to Fridays, inclusive, as follows:—

Radio Awarua ..	8.30 p.m.
Radio Wellington ..	9 p.m.
Radio Awanui ..	10 p.m.

The above are New Zealand mean time—1½ hours ahead of G.M.T. The forecast is not sent out on Saturday or Sunday unless the conditions are exceptional.

PROVISIONAL WIRELESS TIME SERVICE.
It is notified for general information that arrangements have been made for a provisional wireless time service from the standard mean time of the Hector Observatory, Wellington, New Zealand. This service begins on— (see Note below).
The time signals are transmitted by the Wellington Radio Station on a wavelength of 600 metres; the sending key at 400 cycles per second, automatically operated by the observatory.

AUSTRALASIA

Time signals are transmitted by the following stations :—

- Adelaide Radio .. At 12.30 a.m. and p.m. Melbourne Time (0230 and 1430 G.M.T.), international time-signals being used. Wavelength 600.
- Melbourne Radio .. At noon and midnight (Sundays excepted), Victorian standard time (0157-0200 and 1357-1400 G.M.T.), international time-signals being used. Wavelength 600 m.
- Perth Radio .. At 9 a.m. and p.m. on 600 metres wavelength, Melbourne Time (2300 and 1100 G.M.T.). Wavelength 600 metres.

Ocean forecasts are transmitted by the following stations at the hours specified (Melbourne time) :—

- Perth, 11 p.m. (1300 G.M.T.).
 Adelaide, 9.30 p.m. (1130 G.M.T.).
 Brisbane, 10 p.m. (1200 G.M.T.).
 Melbourne, 9 p.m. (1100 G.M.T.).
 Sydney, 8.30 a.m. and p.m. (2230 and 1030 G.M.T.).

Other stations repeat as necessary.

At present an official Ocean Forecast is transmitted daily from the Central Weather Bureau, Melbourne, to all Radio Stations in Australia, also Port Moresby (New Guinea), and it is preceded by a specific statement of sea conditions existing at 9 a.m. around Australia, and sea disturbances off any part of the coast. This information can be obtained by vessels upon request. When weather conditions are severe storm warnings are sent out broadcast by the Shore Stations, and vessels receiving the warnings are requested to communicate them to passing shipping by means of code flags.

Each of the principal radio stations is supplied with a barometer for the purpose of giving information, so that if a shipmaster desires he may obtain the barometer reading, also wind and weather conditions at a radio station, by asking the operator in charge. Daily weather reports (barometer readings, state of wind, weather and sea) are received at the Meteorological Bureau, Melbourne, from shipmasters whenever their vessels are in Australian waters.

The restrictions which were placed on wireless messages during the war have now been removed, and steps have been taken to bring about the resumption of radio weather reports from ships when 300 miles or more from the Australian coastline—many messages are now being received.

NEW ZEALAND

New Zealand stations send out weather forecasts on 600-metre wavelength, Mondays to Fridays, inclusive, as follows :—

- Radio Awarua 8.30 p.m.
 Radio Wellington 9 p.m.
 Radio Awanui 10 p.m.

The above are New Zealand mean time—11½ hours ahead of G.M.T.

The forecast is not sent out on Saturday or Sunday unless the conditions are exceptional.

PROVISIONAL WIRELESS TIME SERVICE.

It is notified for general information that arrangements have been made for a provisional wireless time service from the standard mean time clock of the Hector Observatory, Wellington, New Zealand. This service will begin on——— (see Note below).

The time signals are transmitted by the Wellington Radio Station on a wavelength of 600 metres; the sending key at the radio station being automatically operated by the observatory clock.

The time signal begins at 21 hours 0 minutes 0 seconds Greenwich Mean Time (8 hours 30 minutes p.m. New Zealand Time), and is repeated on the 1st, 2nd, 4th, and 5th minutes.

Each time signal begins exactly at the beginning of the minute and lasts for one second approximately.

In addition to the automatic time signals other signals are transmitted by hand, but they must NOT be used as time signals.

The signals are transmitted in the following manner:—

Greenwich Mean Time.

<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	
20	58	00	to	20	59	05
New Zealand Observatory Time Signals						
twenty-one hours Greenwich Mean Time.						
New Zealand Observatory Time Signals						
twenty-one hours Greenwich Mean Time.						
20	59	15	to	20	59	45
Time Signal.						
21	00	00	to	21	00	01
Time Signal.						
21	00	15	to	21	00	45
Time Signal.						
21	01	00	to	21	01	01
Time Signal.						
21	01	15	to	21	01	45
Time Signal.						
21	02	00	to	21	02	01
Time Signal.						
21	02	15	to	21	03	45
Time Signal.						
21	04	00	to	21	04	01
Time Signal.						
21	04	15	to	21	04	45
Time Signal.						
21	05	00	to	21	05	01
Time Signal.						

The Greenwich Mean Times that the Wireless Time Signals begin at, and the corresponding New Zealand Times are:—

		<i>h.</i>	<i>m.</i>	<i>s.</i>		<i>h.</i>	<i>m.</i>	<i>s.</i>
1st	Time Signal	..	21	00	00	..	8	30
2nd	"	..	21	01	00	..	8	31
3rd	"	..	21	02	00	..	8	32
4th	"	..	21	04	00	..	8	34
5th	"	..	21	05	00	..	8	35

There is no time signal at 21 hours 03 minutes 00 seconds.

The provisional wireless time service will be in operation on Tuesdays and Fridays, provided satisfactory observations have been obtained. The wireless time service will be suspended when owing to bad weather or other causes it is not possible to supply accurate time signals.

N.B.—The date at which this service should begin is left open until the fate of the New Zealand Standard Time Bill is decided by Parliament, because if the Standard Time Bill is passed all New Zealand Mean Times quoted in the notice would have to be increased by 30 minutes.

GENERAL CONDITIONS, AUSTRALIA AND NEW ZEALAND.

Any request for information must be addressed to the Coast Station in the form of a Service message signed by the Commander or responsible officer deputed by him. Information regarding weather should not be asked for during hours of darkness, but should be listened for at the regular transmission periods. Providing, however, that there is no jamming, permission is granted for ships to call up shore stations during the daylight hours to obtain weather reports.

BELGIUM

Hourly Meteorological Reports are issued daily from Brussels (HS) on a wavelength of 1400 m. at 25 minutes past each hour from 0625 to 1625, in exactly the same code as that used for hourly reports in Great Britain (q.v.). The reports refer to Brussels and Ostend.

A report for Brussels in standard code for synoptic reports is also issued at 0715, 1315, 1815 G.M.T.

International Time and Weather Signals

BELGIAN CONGO

Three of the stations in this territory, viz.: Kinshasa, and Elizabethville, have been organised to deal with time follows:—

- (1) Daily reception of time signals from Lyons Station (F)
- (2) Emission of an approximate time signal to stations with

BOLIVIA

In this republic an important meteorological service is carried out by the auxiliary of the telegraphs. Father Tortoso, Director of the A Observatory of the San Calisto College, collects and collates a number of covering his district. The Marconi Wireless Telegraph Station possesses also an annexe wherein are installed instruments for the Small meteorological installations also exist in Tarija, Villa Monte and Copacabana, whilst others are projected in Cuatro Ojos Suarez.

BRAZIL

The Naval Radio Station at Ilha do Governador transmits a series of time signals, planned in accordance with the International Convention, and transmitted on a wavelength of 1,800 metres. These signals are at 10 hours 55 minutes 0 seconds, and at 20 hours 55 minutes 0 seconds de Janeiro time (1357-1400 and 2357-2400 G.M.T.), and follow the procedure as that detailed below under "France, Eiffel Tower." Like signals, the Brazilian series is introduced by the letter O (— — —) Morse alphabet, and the authorities notify us that these introduced which finish at 10 hours 56 minutes 20 seconds, "are for the special observatory, and, therefore, it may be decided at any time to discontinue them." They also state that in case of "an accident preventing mission for correct reception of the signals either at 11 or 21 o'clock signals will be repeated in each case half an hour later at 27-30 instead of 57-60 minutes."

After the time signals issued at 21 o'clock, meteorological and signals are issued in accordance with the rules of the Paris Convention issued:—

The following is the code in which the meteorological reports are issued:—

Station Call Letters, BBBDDFFWS.
Example: SL 567021141 FT 567020 XX RF, etc.

The station letters are as follows:—

MX = Mandoos.	VT = Victoria.	FP = Florianopolis.
BL = Belem.	CF = Cabo Frio.	RG = Rio Grande.
SL = S. Luiz.	RJ = Rio Janeiro.	PA = Porto Alegre.
FT = Fortaleza.	SP = S. Paulo.	CB = Curitiba.
RF = Recife.	ST = Santos.	MV = Montevideo.
BH = Bahia.	PG = Paranaguá.	BA = Buenos Aires.

BRITISH HONDURAS

Weather reports are sent out daily by the station at Belize from to November inclusive at 1140 and 2400 G.M.T. Wavelength 1,000

BULGARIA

Meteorological reports are issued three times daily on a wavelength of 3,800 metres at 0530, 0900, 1300.

BELGIAN CONGO

Three of the stations in this territory, viz.: Kinshasa, Stanleyville and Elizabethville, have been organised to deal with time signals as follows:—

- (1) Daily reception of time signals from Lyons Station (France).
- (2) Emission of an approximate time signal to stations within range.

BOLIVIA

In this republic an important meteorological service is carried on as an auxiliary of the telegraphs. Father Tortoso, Director of the Astronomical Observatory of the San Calixto College, collects and collates a number of data covering his district. The Marconi Wireless Telegraph Station in Viacha possesses also an annexe wherein are installed instruments for this purpose. Small meteorological installations also exist in Tarija, Villa Montes, Ulla-Ulla and Copacabana, whilst others are projected in Cuatro Ojos and Puerto Suarez.

BRAZIL

The Naval Radio Station at Ilha do Governador transmits twice daily a series of time signals, planned in accordance with the International Convention, and transmitted on a wavelength of 1,800 metres. These signals start at 10 hours 55 minutes 0 seconds, and at 20 hours 55 minutes 0 seconds, Rio de Janeiro time (1357-1400 and 2357-2400 G.M.T.), and follow the same procedure as that detailed below under "France, Eiffel Tower." Like the French signals, the Brazilian series is introduced by the letter O (— — —) of the Morse alphabet, and the authorities notify us that these introductory signals, which finish at 10 hours 56 minutes 20 seconds, "are for the special use of the observatory, and, therefore, it may be decided at any time to dispense with them." They also state that in case of "an accident preventing the transmission for correct reception of the signals either at 11 or 21 o'clock, the signals will be repeated in each case half an hour later at 27-30 minutes, instead of 57-60 minutes."

After the time signals issued at 21 o'clock, meteorological and weather signals are issued in accordance with the rules of the Paris Convention of 1912.

The following is the code in which the meteorological reports are issued:—

Station Call Letters, BBBDDFWs.

Example: SL 567021141 FT 567020 XX RF, etc.

The station letters are as follows:—

MN = Manáos.	VT = Victoria.	FP = Florianopolis.
BL = Belem.	CF = Cabo Frio.	RG = Rio Grande.
SL = S. Luiz.	RJ = Rio Janeiro	PA = Porto Alegre.
FT = Fortaleza.	SP = S. Paulo.	CB = Corumbá.
RF = Recife.	ST = Santos.	MV = Montevideo.
BH = Bahia.	PG = Paranaguá.	BA = Buenos Ayres.

BRITISH HONDURAS

Weather reports are sent out daily by the station at Belize from June to November inclusive at 1140 and 2400 G.M.T. Wavelength 1,000 metres.

BULGARIA

Meteorological reports are issued three times daily from Sofia (FF) on a wavelength of 3,800 metres at 0530, 0900, 1,545 G.M.T. (?)

CANADA AND NEWFOUNDLAND

A time signal is sent out by the Camperdown Station daily at 2 p.m. (G.M.T.) on a wavelength of 600 metres.

The Barrington Passage Station sends out messages *re* ice, weather and danger to navigation at 0130, 1330 G.M.T. on a wavelength of 1,600 metres.

The stations of Alert Bay, B.C., Belle Isle, Camperdown, N.S., Cape Bear, Cape Lazo, Cape Race, Cape Ray, Cape Sable, Clarke City, Dead Tree Point, Digby Island, Estevan, B.C., Fame Point, Father Point, Gonzales Hill, Grindstone Island, Grosse Isle (Quebec), Harrington, Heath Point, Ikeda Head, Kingston (Ontario), Midland (Ontario), Montreal, North Sydney, N.S., Pachena, Partridge Island, Pictou, N.S., Point Amour, Point Edward, Point Grey, Point Riche, Port Arthur (Ontario), Port Burwell, Quebec, Sable Island, Sault Ste. Marie (Ontario), Three Rivers (Quebec), Tobermory (Ontario), Toronto, and Triangle Island receive weather forecasts from the Canadian Meteorological Service at 10 p.m. These advices will be transmitted free to any ship station on request. In addition, the station transmits, without coast charge, radiotelegrams of the following kinds:—

1. Any message concerning the navigation of a vessel sent by the captain of the vessel and intended for any department of the Government, any officer of the Government, or the officer in charge of the coast station.

2. Messages exchanged between the captain of any vessel and any person whatsoever concerning the state of the weather, the condition of the tide or ice, or reports on aids to navigation.

CANARY ISLANDS

A meteorological report from the Izana Observatory on the Pico do Teide is sent daily by Tenerife to Carabanchal (Madrid) at 0905 and 1420 (G.M.T. ?).

CHILE

RADIOTELEGRAPH TIME SIGNAL, TRANSMITTED EVERY NIGHT EXCEPTING SATURDAYS AND SUNDAYS AND HOLIDAYS OF THE OFICINA DE HIDROGRAFIA Y NAVEGACION, VALPARAISO.

Important.—The signals will commence punctually at 12 h. 55 m., Greenwich Mean Time, continuing for exactly five minutes and terminating precisely at 13 h., Greenwich Mean Time (8 h. 12 m., 13° 7' s. to 8 h. 17 m. 13° 7' s., local time).

The Oficina de Hidrografía y Navegación transmits daily the radiotelegraph time signal commencing exactly at 12 h. 55 m., Greenwich Mean Time, and continuing for five minutes. (Length of wave, 600 metres.) During this interval each tick or stroke given by the master chronometer of the Oficina is transmitted by the radiotelegraph wave, excepting the twenty-ninth second of every minute, and the last ten seconds of each one of the five minutes. At the exact termination of the five minutes, which will be 1300 Greenwich time, the cipher which indicates the end of the signal is marked by a long contact, as may be seen exactly from the diagram.

If for any reason there should be an error in transmission, the signal "Senal Nula" (Signal null) will be transmitted, repeated three times at 1301 (G.M.T.)

RADIOTELEGRAPH WEATHER REPORTS TRANSMITTED DAILY BY THE STATION OF VALPARAISO.

¶ The Radiotelegraph Station of Valparaiso transmits daily and with the same length of wave as that with which the time signal is transmitted—viz., 600 metres—the meteorological conditions of certain points on the coast and of the Island of Juan Fernandez.

In order that these signals may be received without difficulty by all vessels, they will be transmitted very slowly.

Except on Sundays and holidays there will be transmitted each day at 12 noon, civil mean time of the meridian $70^{\circ} 41' 34''$ 5 W. (1643 G.M.T. nearly), the meteorological conditions at 8 a.m., and at 9 p.m. (time of the same meridian), those prevailing at 4 p.m., there being added to the last report a résumé containing the variations undergone by the atmospheric factors of the day.

The stations on the coast will be represented by letters of the alphabet, generally by the first letter of their name, and in the following form :—

V = Valparaiso.	J = Juan Fernandez.	R = Raper.
T = Talcahuano.	M = Mocha.	P = Punta Arenas.
C = Corral.	G = Guafo.	

The signal will be sent commencing with the letters O.M.C. (Meteorological Office of Chile). Next will be given the barometric pressure in millimetres at sea-level, but suppressing the figure representing the hundreds ; thus, to indicate a pressure of 753 millimetres, the figure 7 will be suppressed and the number 53 will be transmitted.

Following upon that number 53 will be another numerical figure indicating the direction of the wind. The figures used will be from 1 to 8, as follows : 1 corresponding to N. ; 2, NE ; 3, E ; 4, SE ; 5, S ; 6, SW ; 7, W ; 8, NW.

Lastly will follow another figure indicating the force of the wind, according to the scale of Beaufort ; but when forces above 8 have to be given, they will be signalled in words : nine, ten, eleven and twelve.

In the event of its not being possible to communicate the meteorological conditions at any of the stations, the word " N " will be placed before the representative sign of the station in question, but if it is only a part of the information that cannot be given, that part will be replaced by the letter " X."

If the weather is not good in the ports indicated by the bulletin, there will be added in current language some of the words, such as storm, mist, rain or sun.

In order that this may be better understood, we give below a specimen bulletin :—

O.M.C. V 5534, T 5921, C 5172, M 5765, etc.

which signifies :—

Valparaiso,	barometric pressure	755 mm.,	wind	E,	force	4
Talcahuano	"	"	759 mm.	"	NE	" 1
Corral	"	"	751 mm.	"	W	" 2
Mocha	"	"	757 mm.	"	SW	" 5

CHINA

The Shanghai-Zikawei station receives the time of the 8th time-belt (120° east of Greenwich) from the observatory of Zikawei ; and transmits it on the wavelength of 850 metres according to the following table :—

from	10.53'	to	10.54'	a.m.	preliminary signals.
from	10.54'	to	10.54'.50"	a.m.	a series of " G."
at	10.55'			a.m.	a dot.
from	10.56'	to	10.56'.50"	a.m.	a series of " O."
at	10.57'			a.m.	a dot.
from	10.58'	to	10.58'.50"	a.m.	a series of " X."
at	10.59'			a.m.	a dot.
from	4.53'	to	4.54'	p.m.	preliminary signals.
from	4.54'	to	4.54'.50"	p.m.	a series of " G," etc.
continuing as in the morning.					

These times are 0253-0259 and 0853-0859 (G.M.T.).

The time-signal, morning and evening, is followed immediately by a meteorological telegram.

During the typhoon season, the station transmits, in addition to these periodical messages, useful information on the state of the weather.

No charge is made for the meteorological information.

The Cape d'Aguilar station sends time of Hong-Kong observatory on a wavelength of 1,000 metres at 0356-0400 and 1256-1300 (G.M.T.).

CUBA

The experimental station of de Belen at Havana has been assigned to the reception of meteorological signals. (No further particulars are yet to hand.)

CZECHO-SLOVAKIA

Meteorological reports are issued from Prague (PRG) wavelength 4,100 m. C.W., at 9.20h., 15.45h. and 20.30h. (G.M.T.), giving observations for the following:—

Identification Number	Place	Latitude	Longitude
01	Prague	50° 05'	14° 25'
03	Č. Budějovice (Budweis) .. .	49° 25'	14° 40'
05	Čeb (Eger) .. .	50° 05'	14° 22'
06	Milesovka (Donnersberg), Altitude 840 m.	50° 33'	13° 56'
09	Č. Třebová (Böhm. Trübau) .. .	49° 54'	16° 29'
14	Strážnice .. .	48° 53'	17° 18'
18	Oravský Podzámok (Arvaváralja) .. .	49° 16'	21° 21'
22	Bratislava .. .	48° 09'	17° 07'
23	Stará Ľala (O-Gyalla) .. .	47° 52'	18° 12'
24	Nová Ves (Igló) .. .	48° 56'	20° 33'
26	Užhorod (Ungvár) .. .	48° 36'	22° 18'
28	Prerov (Prerau) .. .	48° 09'	17° 07'

The code used for these reports is:—

At 0920 .. . BBDD FWTTT βbbRR MMmm
At 1545 and 2030 ... BBDD FWTT βbb

DENMARK

WIRELESS METEOROLOGICAL REPORTS.

Transmission station: Lyngby Radio (near Copenhagen).

Continuous waves.

Length of wave: 5,000 metres.

Call signal: OXE.

Normal range: 3,000 km.

Hours of sending 0750 Times of observation 0700 (G.M.T.)

" " 1420 " " 1300
" " 1920 " " 1800

International Time and Weather Signal

OBSERVATION STATIONS AND THEIR CALL SIGNALS

		Position
		Lat. Long.
Copenhagen	0 1	55° 41' 12°
Skagen	0 2	57° 44' 10°
Hanstholm	0 3	57° 7' 8°
Blaavandshuk	0 4	55° 33' 8°
Hammeren	0 5	55° 17' 14°

Each radio telegram begins with the words: meteo danois

The 7 o'clock observations will be transmitted for each station according to the normal international code.

The 13 o'clock and 18 o'clock observations will be transmitted for each station, respectively at 1420 o'clock, BBDD, F and at 1920 o'clock, BBDD, FWTT, Bbb, the letters of which have the same meaning as those above.

The figure indicating the condition of the sea is omitted in relation to Copenhagen.

Observations which are not reported in one message will be at the beginning of the next report by adding the hour of the observation to the station call signal.

Morning radio:— SPECIMEN RADIO TELEGRAMS.

meteo danois 01 65732 41139 00000 2112 02 66152 3
20143 03 68732 24119 00001 16102 05 62528 3
16112.

Following radio at 1420:—
meteo danois 0407 68628 32129 20300 19082 01 6495
02 65952 13182 001 03 67280 42153 312 04 68530
05 60578 53173 316.

In the above morning radio, the Blaavandshuk (04) morning is missing. This morning observation will be found in the 1420 the group 0407 (indicating Blaavandshuk at 7 o'clock).

Besides this, the addition of the call signal of a station at observation will be used to correct a faulty message.

ESTHONIA
Meteorological reports are issued twice daily from Reval (I) wavelength of 1,900 m. (C.W.) at 0840 and 2200 G.M.T., giving observations for 0700 and 1300 and 2100, made at (1) Reval, (2) Dorpat, and (3) stations is adhered to in the messages, but in the evening messages a reports precede the 2100 reports. For the 0700 observations the code BBDD FWTTW¹ bbbRR MMmm

The value of tendency is given in tenths of a millimetre, and so for a falling barometer: 50 is also added to the direction of the this case. For the 1300 and 2100 observations the code used is— BBDD FWTTW¹

Example of an evening message:—
Meteo Esthonie 65232 25122 x x 66728 15141 62316 12035 50
63120 14065
The x x indicate that the midday observations for Reval and Filsand.

the last six groups give the 2100 observations for Reval and Filsand.

OBSERVATION STATIONS AND THEIR CALL SIGNALS.

				Position.	
				Lat.	Long.
Copenhagen	..	..	0 1	55° 41'	12° 35'
Skagen	..	..	0 2	57° 44'	10° 38'
Hanstholm	..	..	0 3	57° 7'	8° 36'
Blaavandshuk	..	..	0 4	55° 33'	8° 5'
Hammeren	..	..	0 5	55° 17'	14° 46'

Each radio telegram begins with the words : meteo danois.

The 7 o'clock observations will be transmitted for each station in four groups of five figures : BBBDD, FWTTN, BbbRR, MMmms, to be deciphered according to the normal international code.

The 13 o'clock and 18 o'clock observations will be transmitted in three groups for each station, respectively at 1420 o'clock, BBBDD, FWTTs, Bbb, and at 1920 o'clock, BBBDD, FWTT, Bbb, the letters of which are of the same meaning as those above.

The figure indicating the condition of the sea is omitted in the groups relating to Copenhagen.

Observations which are not reported in one message will be transmitted at the beginning of the next report by adding the hour of the missing observation to the station call signal.

SPECIMEN RADIO TELEGRAMS.

Morning radio :—

meteo danois 01 65732 41139 00000 2112 02 66152 34159 30101
20143 03 68732 24119 00001 16102 05 62528 33129 00000
16112.

Following radio at 1420 :—

meteo danois 0407 68628 32129 20300 19082 01 64952 2117 306
02 65952 13182 001 03 67280 42153 312 04 68530 20171 000
05 60578 53173 316.

In the above morning radio, the Blaavandshuk (04) morning observation is missing. This morning observation will be found in the 1420 radio after the group 0407 (indicating Blaavandshuk at 7 o'clock).

Besides this, the addition of the call signal of a station at the time of observation will be used to correct a faulty message.

ESTHONIA

Meteorological reports are issued twice daily from Reval (ELN) on a wavelength of 1,900 m. (C.W.) at 0840 and 2200 G.M.T., giving observations for 0700 and 1300 and 2100, made at (1) Reval, (2) Dorpat, and (3) Filsand.

Each message begins with the words Meteo Esthonie. A fixed order of stations is adhered to in the messages, but in the evening messages *all* the 1300 reports precede the 2100 reports. For the 0700 observations the code used is—

BBBDD FWTTW¹ bbbRR MMmm

The value of tendency is given in tenths of a millimetre, and 500 is added for a falling barometer : 50 is also added to the direction of the wind for this case. For the 1300 and 2100 observations the code used is—

BBBDD FWTTW¹

Example of an evening message :—

Meteo Esthonie 65232 25122 x x 66728 15141 62316 12035 59418 13045
63120 14065

The x x indicate that the midday observations for Dorpat are missing : the last six groups give the 2100 observations at Reval, Dorpat and Filsand.

FRANCE (EIFFEL TOWER, PARIS)

Lat. 48° 51' 41" N. Long. 2° 18' 15" E.

The following arrangements are based on the decisions arrived at by the International Time Conference held in Paris in 1912 modified in accordance with the teachings of experience :—

The radiotelegraph station of the Eiffel Tower transmits each day signals and telegrams of general interest, which are enumerated below :—

" Ordinary time signals " sent out thrice daily : (1) at 10 a.m.,* (2) between 10.44 a.m. and 10.49 a.m.,* and (3) at 11.44 p.m. to 11.49 p.m.*

" Scientific time signals " at 11.30 p.m. preceding the ordinary night time signals, and a correction group (following the ordinary night signals) at 11.50 p.m.

The following transmissions are made regularly from Eiffel Tower, using damped waves :—

<i>G.M.T.</i>	<i>Nature of Signals.</i>						<i>Wavelength.</i>
0245-0255	..	Weather Report	..	..	..	..	2,500
0815-0825	..	Weather Report	..	..	..	..	2,500
0956-1000	..	International Time Signals	..	..	..	..	2,500
1002-1005	..	Sidereal Time Signals	..	..	..	..	2,500
1044-1049	..	French Time Signals	..	..	..	..	2,500
1130-1145	..	European Weather Report	..	..	..	..	2,500
1415-1425	..	Weather Report	..	..	..	..	2,500
1500-1530	..	Press .. ..	..	..	..	..	3,200
1930-1940	..	Weather Report	..	..	..	..	2,500
2329-2333	..	Astronomical Time Signals	..	..	..	..	2,500
2344-2349	..	French Time Signals	..	..	..	..	2,500
2349-2351	..	Series of Code Figures relating to the Astro- nomical Time Signals	..	..	..	..	2,500

Press transmission is made at 08.00, 13.00 and 16.30, using continuous waves.

ORDINARY TIME SIGNALS.

According to the original scheme of signals, at 9.55 a.m. three calls (— • — • —) were given, followed by " ordinary time signals," then the signal " wait " (• — • • •).

The " ordinary time signals " commence at 9.56 a.m. and end at 10 a.m. They are transmitted automatically by means of special apparatus situated at the observatory in Paris and managed by the staff of that establishment.

The connection between this apparatus and the radio station at Eiffel Tower is established a few instants before the transmission by means of subterranean lines.

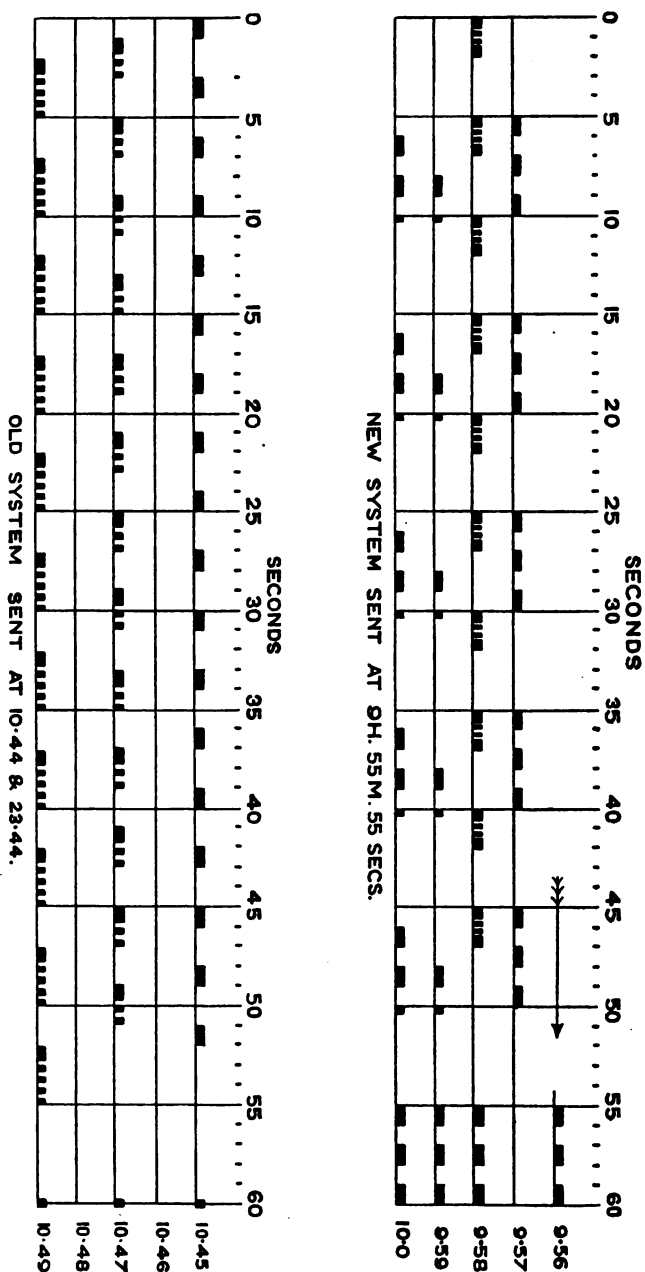
The composition of these signals is given by the illustration on the next page.

The complete minutes 9.58, 9.59, 10.0, are therefore indicated by the end of the 3rd lines of the series of three dashes, all confusion being avoided by the fact that the signals preceding these dashes are different for each minute.

The letters O (— — —) of the first minute and X (— • • —) of the second minute constitute only advice and tuning signals.

* See Diagram.

Diagram illustrating the 10 a.m., Ordinary Time Signal, and the 10.49 and 23.49 Time Signal.



The international service of time signals is shown in the above diagram. The position of the — • — is quite arbitrary. It varies with the different services and is not the same in the two automatic apparatus employed for the transmission of time signals. This is immaterial because it only affects the preliminary signals for the transmitting apparatus and is not utilised for measuring time.

All the dashes, dots, and spaces of dots or dashes of any one letter in the remainder of the signals are of equal duration: dashes = one second, dots = one-quarter of a second, intervals = one second.

The letters N (— •) which characterise the third minute commence at the seconds, 8, 18, 28, 38, 48, and the beginning of the dots of these same letters coincide exactly with the seconds 10, 20, 30, 40, 50.

In the same way the letters G (— — •) characterising the fourth minute commence at the seconds 6, 16, 26, 36, 46, and the beginning of the dots of these same letters coincide exactly with the seconds, 10, 20, 30, 40, 50.

The second set of time signals starts at 10.44 a.m. with a series of "T" (—), followed by one dot at 10.45 a.m. precisely. At 10.46 a.m. the French operator sends a series of "D" (— • •), which is again followed by a dot at 10.47 a.m., whilst at 10.48 a.m. starts a series of "6" (— • • • •), again followed by a dot at 10.49 a.m.

The signals "T," "D," and "6," are sent by hand by an operator at the observatory, only the three dots at 10.45, 10.47, and 10.49, are automatically sent by the special apparatus.

The "ordinary time signals" by night are transmitted in the same way.

The calls are initiated at 11.44 p.m. (or 2344 French time) beginning with a "T" series, followed by a dot at 11.45 p.m., continued by a "D" series at 11.46 p.m., followed by a dot at 11.47 p.m., and completed by a "6" series starting at 11.48 p.m., followed by a dot at 11.49 p.m.

For receiving these hourly signals, termed "ordinary," it is only necessary to have an antenna, of dimensions and height varying according to the distance from Paris, connected with a radiotelegraphic receiver, and to listen to the signals, with the clock or watch to be compared in front of the observer. It is easy for an unskilled person to start by estimating the difference up to half a second between the hours indicated by the clock and those which correspond with the signals that are heard in the telephones of the receiver. After some practice it is quite easy to estimate one-quarter of a second. In order to reach an accuracy of one-tenth of a second it is generally necessary to have recourse to simultaneously recording on the same photographic strip the radiotelegraphic signals and the beats of the clock to be compared. Excellent results have in this way been obtained by various physicists and engineers.

It frequently occurs, especially in winter, that the Paris Observatory is not able to make astronomical observations each night. It is therefore necessary to be satisfied with the times registered by the chronometers of which the rate is known for the setting of the clock which sends the signals. These chronometers being sufficiently numerous and accurate, such a procedure causes no inconvenience so long as the cessation of astronomical observations does not exceed a few days. If, on the other hand, the period of cloudy weather continues too long, it is no longer possible to answer for the accuracy of the chronometers. Wireless telegraphy in such cases furnishes a method which allows of the co-operation of other observatories, better situated as regards climatic conditions, in the determination of the state of the master-clock at Paris, and in consequence in the accurate setting of the clock which sends the signals.

SCIENTIFIC TIME SIGNALS.

Every night at 11.29 p.m. (2329 French time) three calls (— • — • —) are made.

Starting at 11.30 p.m. (2330 French time) a series of 300 dots each formed of a single spark are transmitted, the 60th, 120th, 180th and 240th being suppressed in order to establish the indication for counting purposes.

This series is heard at the observatory in Paris in a wireless receiver and compared with the tickings of a time-keeping clock by the coincidence method.

A simple calculation permits of deducing the times (as marked by the clock) from the coincidences of the 1st and 300th dots of the series, which are exact to 1 or 2 hundredths of a second. These may be transformed into "legal time hours" by adding the corresponding correction of the clock.

These latter hours are transmitted by the Eiffel Tower soon after the end of the "ordinary time signals" at night, in the following manner:—

If the times of the 1st and 300th beats are, for instance, 11 hours 30 minutes 8.15 seconds p.m. and 11 hours 35 minutes 1.17 seconds p.m., the two following groups of figures will be twice repeated:—

— • • • = 300815. 350117 — • • • = 300815. 350117
— • • • = 300815. 350117.

In order to know approximately the correction to be made to a clock (or a chronometer) with reference to the legal international time of the observatory, it is sufficient to listen to the ticking of that instrument by means of a microphone suitably attached to a radiotelegraphic receiver at the same time as the series of 300 points are transmitted by the Eiffel Tower. It is necessary to observe and note the coincidences, and then the hours of the clock (or the chronometer) should be calculated at the moment of the 1st and 300th dots.

By subtracting these times respectively from those sent out by the Eiffel Tower, it is possible to obtain two correcting values for applying to the readings of the clock for measuring time which should be correct to about two hundredths (.02) of a second.

METEOROLOGICAL REPORTS FROM EIFFEL TOWER.

The meteorological messages from the Eiffel Tower contain observations from 22 French stations and from Brussels and Mayence, and are issued at the following hours (Greenwich time):—

2 h. 45 m.	Observations at	1 h.
8 h. 15 m.	"	7 h.
14 h. 15 m.	"	13 h.
19 h. 30 m.	"	18 h.

Wavelength, 2,500 metres.

The information is sent in the following order:—

(1) *Observations at 7 a.m.*

Four groups of five figures for each station.

BBBDD FWTTC βbbRR MMmms

The symbols have their usual significance, but barometric values are expressed in millimetres and tenths and

C = Direction of upper cloud (cirrus and cirrostratus) 0-8 (International Code).

RR = Rain, in millimetres, for previous 24 hours.

MM = Maximum temperature 7 a.m. to 7 a.m.

mm = Minimum Temperature.

S = State of sea, 0-9. (This figure is omitted when the station is inland—only four figures being sent).

Upper Winds.

Two groups of 6 letters for each station:—

D₁ V₁ D₂ V₂ D₃ V₃ D₄ V₄ D₅ V₅ D₆ V₆
D₁ D₂ D₃ D₄ D₅ D₆ Indicates the direction of the wind at the different altitudes.

$V_1 V_2 V_3 V_4 V_5 V_6$ Indicates the force of wind at different altitudes.

D_1 and V_1 at	500 metres.
D_2 and V_2 „	1,000 „
D_3 and V_3 „	1,500 „
D_4 and V_4 „	2,000 „
D_5 and V_5 „	3,000 „
D_6 and V_6 „	4,000 „

The value of the letters employed are shown below.

(2) OBSERVATIONS AT 1, 13 AND 18 HOURS.

One group of five figures, one group of four figures and one group of three figures for each station.

B B B D D F W T T β b b

Upper Winds.

Two groups of six letters for each station.

$D_1 V_1 D_2 D_3 V_4$ $D_4 V_4 D_5 V_5 D_6 V_6$

The telegrams commence by the words :—

Météo France.

The groups of figures and the groups of letters for each station are preceded by a group of two figures indicating the station.

Missing stations are shown by five x's—x x x x x preceded by the number of the station.

Groups of figures are given for the following stations :—

01 Ile d'Aix.	18 Rennes.
02 Biarritz.	19 Strasbourg.
03 Bordeaux	21 Toulouse.
04 Brussels.	22 Tours.
05 Cherbourg.	24 St. Julien.
06 Clermont.	27 Alençon.
07 Dijon.	28 Amiens.
08 St. Inglevert.	29 Cosne.
09 Limoges.	30 Le Havre.
11 St. Mathieu.	31 Istres.
13 Mayence.	32 Metz.
14 Montpellier.	33 Privas.
15 Paris.	34 Sommesous.

Groups of letters are sent for the following stations :—

03 Bordeaux.	15 Paris.
04 Brussels.	17 St. Pierre Quiberon.
14 Montpellier.	19 Strasbourg.

For upper winds the following code is used :—

Direction of Wind.

NNE	..	..	..	a	SSW	..	..	..	i
NE	..	..	..	b	SW	..	..	..	j
ENE	..	..	..	c	WSW	..	..	..	k
E	..	..	..	d	W..	..	..	..	l
ESE	..	..	..	e	WNW	..	..	..	m
SE	..	..	..	f	NW	..	..	..	n
SSE	..	..	..	g	NNW	..	..	..	o
S ..	..	..	..	h	N	..	..	..	p

International Time and Weather Signals.

Metres per second :—	Speed of Wind.		
0	a	26	.. ..
2	b	28	.. ..
4	c	30	.. ..
6	d	32	.. ..
8	e	34	.. ..
10	f	36	.. ..
12	g	38	.. ..
14	h	40	.. ..
16	i	42	.. ..
18	j	44	.. ..
20	k	46	.. ..
22	l	48	.. ..
24	m		.. ..

Letter x denotes missing observations.
The following is the message issued at 09.45 on January 30th
names of the stations have been inserted next to the Index number

	BBBDD	FWTTC	β bbRR
Ile D'Aix			
01 Biarritz	64170	65099	71005
02 Brussels	69816	34109	50304
04 Cherbourg	xxxxx		
05 Clermont	56224	11079	22220
06 Dijon	69366	14009	10400
07 Gris Nez	68468	20803	30400
08 Limoges	53870	74085	71316
09 St. Mathieu	66068	25059	702xx
11 Marseilles	59628	53109	22202
12 Mayence	67930	10039	21006
13 Paris	xxxxx		
15 Perpignan	60868	55069	31703
16 Rennes	70000	00020	40200
18 Strasbourg	58322	34129	10209
19 Bordeaux	68070	11019	60497
03 Brussels	Pluie		
04 Montpellier	xxxxx		
14 Paris	xxxxx		
15 St. Pierre Quiberon	Pluie		
17 Strasbourg	Plafond trop bas		
19	xxxxx		

Metres per second :—				<i>Speed of Wind.</i>			
0	..	..	..	a	26	..	n
2	..	..	..	b	28	..	o
4	..	..	..	c	30	..	p
6	..	..	..	d	32	..	q
8	..	..	..	e	34	..	r
10	..	..	..	f	36	..	s
12	..	..	..	g	38	..	t
14	..	..	..	h	40	..	u
16	..	..	..	i	42	..	v
18	..	..	..	j	44	..	w
20	..	..	..	k	46	..	y
22	..	..	..	l	48	..	z
24	..	..	..	m			

Letter x denotes missing observations.

The following is the message issued at 09.45 on January 30th, 1920. The names of the stations have been inserted next to the Index numbers.

	BBBDD	FWTTC	βbbRR	MMNN Sea
Ile D'Aix				
01	64170	65099	71005	1008
Biarritz				
02	69816	34109	50304	11065
Brussels				
04	xxxxx			
Cherbourg				
05	56224	11079	22220	1106
Clermont				
06	69366	14009	10400	0953
Dijon				
07	68468	20803	30400	0700
Gris Nez				
08	53870	74085	71316	07046
Limoges				
09	66068	25059	702xx	0904
St. Mathieu				
11	59628	53109	22202	11096
Marseilles				
12	67930	10039	21006	1203
Mayence				
13	xxxxx			
Paris				
15	60868	55069	31703	0904
Perpignan				
16	70000	00020	40200	1101
Rennes				
18	58322	34129	10209	1201
Strasbourg				
19	68070	11019	60497	1001
Bordeaux				
03	Pluie			
Brussels				
04	xxxxx			
Montpellier				
14	xxxxx			
Paris	Pluie			
15				
St. Pierre Quiberon				
17	Plafond trop bas			
Strasbourg				
19	xxxxx			

EUROPEAN WEATHER REPORT.

This message, issued from the Eiffel Tower (FL) at 11.30 a.m. G.M.T., gives information for 7 a.m. G.M.T. in the code BBDDFW for the following stations :—

S=Stornoway.	V=Valencia.	C=Copenhagen.
HE=Hilder.	PR=Prague.	P=Paris.
O=Ushant.	CF=Clermont-Ferrand.	N=Nice.
PE=Perpignan.	BI=Biarritz.	CR=Corunna.
R=Rome.	A=Algiers.	

The figure groups are followed by a description (in plain language) of the pressure distribution and by a general forecast for the following day.

HOURLY METEOROLOGICAL REPORTS.

Reports are issued daily from le Bourget (ZM) at 30 minutes past each hour in the same code as that used for hourly reports in Great Britain (*q.v.*).

Other meteorological reports are issued from Naval stations on a wavelength of 1,350 metres in the code BBBDD FWTC β bbRR MMmmS for observations at 0700, and BBBDD FWTC β bb for observations at 1300, 1800.

(a) From Mourillon, near Toulon (FUT), at 0915 (observation at 0700), and 1900 (observations at 1800) for : (1) Cap Bearn, (2) Cete, (3) Aubagne, (4) Toulon, (5) St. Raphael, (6) Ajaccio.

Reports begin with the words Meteo-Mourillon. Upper air observations are added in the code DDYY (DD=direction, YY=velocity in m/s) for heights of 200, 500, 1,000 and 2,000 metres.

(b) From Sidi Abdallah reports begin with words Meteo-Sidi-Abdallah, and are issued at 0945 (observations at 0700), 1930 (observations at 1800), for : (1) Djebel Krichtel, (2) Baraki, (3) Cape Garde, (4) Sidi Ahmed, (5) Sfax.

(c) From Dran (FUO) at 0930, 1400, 1945.

(d) From Bizerte (FUA) at 1015, 1415, 2015.

(e) Reports beginning Meteo-Alger are issued at 1345 (observations at 0700) for : (1) Rabat, (2) Nemours, (3) Tenes, (4) Algiers, (5) Cape Garde, (6) Bizerte, (7) Sfax, (8) Marseilles, (9) Colomb Béchar, (10) Laghouat, (11) Tougourt.

FRENCH OCEANIA

The Papeete station (Tahiti Is.) transmits every day, including holidays, on the wavelength of 600 metres, two meteorological reports, one at 11 a.m. and the other at 11 p.m. (G.M.T.), which are made up as follows :—

I.

The reports contain the date of the report of the meteorological station of Point Venus, followed by a group of 8 figures in normal code : BBBDDFWS.

The report is preceded by the following signal : " Tahiti observatoire."

II.

Notice to navigators concerning alterations of lightship or light buoys, the presence of derelicts, and the disappearance of lightbuoys or important buoys, and any other information in regard to navigation, will be added, as occasion arises, in the report. It will be sent out in French and English.

III.

The reports will be transmitted three times in succession ; the first time transmission will be made rapidly, the second and third times slowly.

IV.

A safety signal will be transmitted to ships at any hour of the day or night, repeated at short intervals ten times on full power: Tahiti T.T.T., followed by advice of cyclones, typhoons or derelicts, or any sudden changes in the position or form of fixed obstructions or of land marks. The message will be repeated three times with intervals of ten minutes.

GERMANY

The Nauen high-power station at present broadcasts time signals at noon and midnight (G.M.T.) on a wavelength 3,900 m. in accordance with the Onogo arrangement which was agreed upon at the International Time Conference. This station further transmits at 0900 and 1940 (G.M.T.) "*International Weather Reports*" with the same wavelength.

Following upon the Nauen time Signal, "Weather reports" are transmitted from Norddeich wavelength 600 m., a speed of 60 letters per minute, at noon (G.M.T.). If they do not arrive at Norddeich until after that time, they will be given in the same manner at 1700 (G.M.T.). Further, Norddeich will transmit on the same wavelength and at the same speed "Important News for Seafarers" and "Storm Warnings"; the former are transmitted three times immediately after they are received and are also, as long as may be necessary, repeated three times after the Nauen time signal; the latter are also transmitted three times immediately after receipt, and also are repeated once after the weather reports at noon (G.M.T.), or, if the storm warnings are received later at Norddeich, at 1700 (G.M.T.).

Regarding the furnishing, on payment, of "Weather Information" through the coast stations of Norddeich, Cuxhaven, Bülk, Swinemünde, and Pillau, to passing ships, and regarding which negotiations are still pending, further information will be published in due course in the "Nomenclature Officielle des Stations Radiotélégraphiques" etc.

The observations for 0700 are sent at 0900 in the code

BBBDD FWTTT cbbRR MMmms

and the observation for 1800 are sent at 1940 in the code

BBBDD FWTTW¹ where W¹ refers to past weather.

The stations used are Borkum, Keitum, Hamburg, Swinemünde, Neufahrwasser, Memel, Aachen, Hanover, Berlin, Dresden, Breslau, Karlsruhe, Frankfurt, Munich, Vienna.

GIBRALTAR

A meteorological report is issued twice daily from Gibraltar (BWW) on a wavelength of 2,700 m. at 1400 and 2200 (G.M.T.).

GREECE

Athens transmits a meteorological report at 0700 (GMT) on a wavelength of 1200 metres.

The transmission of meteorological, aviation, and time signals is shortly being placed on a new basis.

HAWAII

Weather bulletins obtained from the United States Weather Bureau at Honolulu are broadcasted daily by the Pearl Harbour Radio Station (NPM) at 8 a.m., noon, 4 p.m., and 8 p.m., and after time signal.

Time Signal.—U.S. Naval Radio Station, Pearl Harbour, T.H., transmits time signals daily on 600-meter damped, and 11,200-meter undamped, waves at noon, 180th meridian time—*i.e.*, at 2355-2400 (G.T.M.), accurate to within 0.2 second with San Francisco Naval Observatory time.

HONG-KONG

A summary of meteorological conditions and weather forecasts will be broadcasted (on a 600-metre wave) by Cape d'Aguilar daily at 1 p.m. Hong-Kong standard time (5 a.m. G.M.T.) and repeated at 5 p.m. Hong-Kong standard time (9 a.m. G.M.T.).

Storm warnings are broadcasted at about noon and repeated every two hours until midnight. If a second warning is issued during the day the later warning will be substituted.

When within range of Cape d'Aguilar, ships send observations made at 6 a.m. and 2 p.m. Hong-Kong time (10 p.m. and 6 a.m. G.M.T.), and a message containing the following information:—

- (a) Ship's name, position and the time of observation (G.M.T.).
- (b) Barometer reading (with no correction whatever).
- (c) Thermometer reading (if the barometer is of the mercurial type).
- (d) Wind direction and force.
- (e) State of weather (in plain language).

The Hong-Kong Observatory also sends wireless Time Signals *via* Cape d'Aguilar at the even seconds between 11.56 a.m. and noon, and between 8.56 p.m. and 9 p.m. Hong-Kong time (3.56 a.m. to 4 a.m. and 12.56 p.m. to 1 p.m. G.M.T.). The 2nd, 28th, 50th, 52nd and 54th second of each of the above minutes are omitted for the purpose of identifying the signals.

The Time Signals are preceded by the following warning signals from Cape d'Aguilar between 11.54 a.m. and 11.55 a.m. and between 8.54 p.m. and 8.55 p.m. Hong-Kong time (3.54 a.m. and 3.55 a.m. and 12.54 p.m. and 12.55 p.m. G.M.T.):—

CQ DE VPS HK TIME WAIT

Both warning and Time Signals are sent out on a wavelength of 1,000 metres from a 5 kw. spark set. The Time Signals are dots of about 0.2 second duration. Radiotelegraphic land and ship stations within range of Cape d'Aguilar are required to keep silent between 11.54 a.m. and noon, and 8.54 p.m. and 9 p.m. Hong-Kong time (3.54 a.m. and 4 a.m. and 12.54 p.m. and 1 p.m. G.M.T.) in accordance with Article 45, paragraph 3 of the Service Regulations appended to the International Radiotelegraph Convention of 1912.

INDIA

Time Signals based on the International system are sent out from Calcutta Radio Station (VWC) twice daily, at 0127-0130 and 1327-1330 (G.M.T.). The wavelength used is 2,000 metres and the power 30 kw. The signals are controlled from the Alipore Observatory at Calcutta.

Should the time signals be inaccurate for any reason, they will be followed by the "erase" signal of nine or more dots and the words "Signal failed."

Arrangements are being made for similar signals to be sent out at 0057-0100 and 1257-1300 (G.M.T.) from Bombay Radio Station (VWB). These signals will be controlled from Colaba Observatory, Bombay.

With regard to weather reports, the following details are published for information.

The Meteorological Department supplies each day to the radio stations concerned messages to be signalled broadcast at the following times and on the specified wavelengths:—

Station.	Call-sign.	Wavelength metres.		Time (G.M.T.)
Bombay	VWB	..	2,000	0100 and 1300
Madras	VWM	..	2,000	
Rangoon	VTR	..	1,200	
Karachi	VWK	..	2,000	
Calcutta	VWC	..	2,000	0130 and 1330
Port Blair	VTP	..	1,200	

These reports do not contain actual observations but only a short description of general conditions prevailing. The report sent out from Bombay and Karachi gives the weather conditions in the East Arabian Sea, while that broadcasted from the other four stations refers to the Bay of Bengal.

ITALY

AEROLOGICAL AND METEOROLOGICAL SERVICE.

I. At present the service is carried out by three groups of stations, the central station of the first group being at Rome, that of the second group at Florence, and that of the third at Naples.

II. Transmissions are made twice a day at the hours given in the table below, in which the length of wave used is also given :—

<i>Groups.</i>	<i>Stations.</i>	<i>Times.</i>	<i>Wave-lengths.</i>
I. Central Station,			
Rome	.. Genoa*	.. 0730 to 0735 1330 to 1335	600 s.
	.. Leghorn	.. 0735 „ 0740 1335 „ 1340	1,200
	.. Ancona	.. 0755 „ 0800 1355 „ 1400	1,200
II. Central Station,			
Florence	.. Padua	.. 0740 „ 0745 1340 „ 1345	900
	.. Turin	.. 0745 „ 0750 1345 „ 1350	900
	.. Milan	.. 0750 „ 0755 1350 „ 1355	900
III. Central Station,			
Naples	.. Vittoria*	.. 0725 „ 0730 1325 „ 1330	600
	.. Maddalena	.. 0730 „ 0735 1330 „ 1335	600
	.. Messina	.. 0735 „ 0740 1335 „ 1340	600
	.. Brindisi	.. 0740 „ 0745 1340 „ 1345	2,500 arc.

III. The Florence and Naples stations transmit a summary of the reports received to Rome (ICD) at the following times, and with the following wave-lengths :—

<i>Stations.</i>	<i>Times.</i>	<i>Wavelength.</i>
Naples	0800 to 0810 1400 to 1410	3,200 arc.
Florence	0810 „ 0820 1410 „ 1420	900 s.

IV. The complete reports are then transmitted from Rome (IDO) at 09.30 and 14.45, with wavelength 11,000c. At 03.45 Rome (IDO) transmits a local weather report to Paris.

V. The aerological stations are identified by the groups of two figures given next to each station :

04 Padua	12 Maddalena
06 Genoa	13 Naples
07 Florence	14 Brindisi
08 Leghorn	16 Messina
09 Ancona	18 Vittoria

* Genoa passes the reports to Leghorn and Vittoria to Messina for transmission to Centocelle.

VI. Other aerological stations will be added to those mentioned above and will commence operations as soon as ready. The complete list with corresponding numbers is as follows:—

01 Turin	11 Rome
02 Milan	12 Maddalena
03 Trent	13 Naples
04 Padua	14 Brindisi
05 Trieste	15 Cagliari
06 Genoa	16 Messina
07 Florence	17 Palermo
08 Leghorn	18 Vittoria
09 Ancona	19 Taranto
10 Chieti	

VII. The reports will be drawn up in the following form:—

BBBcHW/LAdSVD/V₁D₁V₂D₂V₃D₃/V₄D₄V₅D₅V₆D₆

Where BBB and c and S have the usual meaning, but—

H=the relative humidity from 0 to 100 (Table II).

W=the weather at the time of observation (Table III).

L=the amount of cloud (0=nil, 10=overcast).

A=Type of cloud to which the greatest importance is attached (Table V).

d=direction in which clouds are moving according to the eight fundamental directions (Table VI).

V=Velocity of the wind at ground level in m/s (Table VIII).

D=Direction of the wind (Table VI).

V₁D₁V₂D₂, etc., denote the velocity of the wind in m/s and the respective directions at 500 m., 1,000 m., 1,500 m., 2,000 m., 3,000 m., and 4,000 m. above sea-level.

TABLE II (H).

0	from	0	to	10
1	"	10	"	20
2	"	20	"	30
3	"	30	"	40
4	"	40	"	50
5	"	50	"	60
6	"	60	"	70
7	"	70	"	80
8	"	80	"	90
9	"	90	"	100

TABLE V (A).

1	Stratus (st).
2	Nimbus (nb).
3	Strato cumulus (st-cu).
4	Cumulus (cu).
5	Cumulo nimbus (cu-nb).
6	Alto stratus (a-st).
7	Alto cumulus (a-cu).
8	Cirro cumulus (ci-cu).
9	Cirrus (ci).

TABLE III (W).

0	Clear horizon.
1	Slight haze.
2	Heavy haze.
3	Drizzle.
4	Rain.
5	Snow.
6	Slight fog.
7	Dense fog.
8	Storm.
9	Storm in sight.

TABLE VI (d.D).

0	No direction.
1	from N.
2	" N.E.
3	" E.
4	" S.E.
5	" S.
6	" S.W.
7	" W.
8	" N.W.

TABLE VIII (V).

0	from	0	to	1
1	"	1	"	3
2	"	3	"	5
3	"	5	"	7
4	"	7	"	9
5	"	9	"	11
6	"	11	"	13
7	"	13	"	15
8	"	15	"	17
9	above	17.		

NOTES.—Should any data be missing from a group, an equal x's are inserted in its place. Should soundings not be taken, telegraph message concerning one station will consist of only (meteorological); and when the sounding does not reach 2,000 m., less telegraph message will consist of three groups (two meteorological).

The "Saseno" IDB wireless telegraph station transmits and meteorological reports at 0700 and 1700 to the ship at B with a 600 s. wave.

The wireless telegraph station at Centocelle (Rome) and (Naples) also carry out the following special service for the reports on local weather conditions, and on the departure and aircraft for the Rome to Naples and Naples to Rome service.

Centocelle	"	0700	Exchange of m.
St. Elmo	"	to	information an
"	"	3,850 c.	movements of
Centocelle	"	at 0915	Bulletin.
"	"	1100	Bulletin.
"	"	1515	Bulletin.

TRANSMISSION OF METEOROLOGICAL REPORTS BY WIRELESS T. JAPAN
(Notification of the Department of Communications No. December 11th, 1914.)

Relating to the transmission of storm warnings at the Wireless Choshi Radio, Fukkikaku, and Dairenwan.

The storm warnings issued by the Central Meteorological at Tokyo are transmitted free of charge to vessels at sea from telegraph stations at Choshi, Fukkikaku and Dairenwan, according to following method (it always being understood that this shall not be case of special transmissions made at the request of vessels):

The storm warnings will be issued in the English language comprise the items referred to in (a) and (b) below:

(a) Text of warning, date, time; position, rate and direction of centre of atmospheric depression or typhoon.

(b) Maritime instructions and notices. When storm warning received at the coastal stations, they will be immediately transmitted will be repeated from the Choshi station at 9.5 p.m., from the station at 8.30 p.m., and from the Dairenwan station at 9 p.m.

Wavelengths of 600 metres are employed, and the storm warning continued three times after the signal "QST" has been thrice received.

NOTIFICATION OF THE DEPARTMENT OF COMMUNICATIONS No. From December 11th, 1916, the following procedure for a central standard time at 1200-1204 (G.M.T.) by wireless telegraph adopted at the Choshi and Funabashi wireless telegraph

TABLE VIII (V).

0	from	0	to	1
1	"	1	"	3
2	"	3	"	5
3	"	5	"	7
4	"	7	"	9
5	"	9	"	11
6	"	11	"	13
7	"	13	"	15
8	"	15	"	17
9	above 17.			

NOTES.—Should any data be missing from a group, an equal number of x's are inserted in its place. Should soundings not be taken, the wireless telegraph message concerning one station will consist of only two groups (meteorological); and when the sounding does not reach 2,000 m. the wireless telegraph message will consist of three groups (two meteorological and one aerological).

The "Saseno" IDB wireless telegraph station transmits aerological and meteorological reports at 0700 and 1700 to the ship at Brindisi IDV, with a 600 s. wave.

The wireless telegraph station at Centocelle (Rome) and St. Elmo (Naples) also carry out the following special service for the exchange of reports on local weather conditions, and on the departure and arrival of aircraft for the Rome to Naples and Naples to Rome service.

St. Elmo W/T station, wave 3,200 c.	0700	Exchange of meteorological
	to	information and reports of
Centocelle 3,850 c.	0745	movements of aircraft.
St. Elmo at	0915	Bulletin.
	1100	
Centocelle 1515	Bulletin.	

JAPAN

TRANSMISSION OF METEOROLOGICAL REPORTS BY WIRELESS TELEGRAPHY.

(Notification of the Department of Communications No. 836,
December 11th, 1914.)

Relating to the transmission of storm warnings at the Wireless Stations at Choshi Radio, Fukkikaku, and Dairenwan.

The storm warnings issued by the Central Meteorological Observatory at Tokyo are transmitted free of charge to vessels at sea from the wireless telegraph stations at Choshi, Fukkikaku and Dairenwan, according to the following method (it always being understood that this shall not apply in the case of special transmissions made at the request of vessels):

The storm warnings will be issued in the English language, and will comprise the items referred to in (a) and (b) below:

(a) Text of warning, date, time; position, rate and direction of movement of centre of atmospheric depression or typhoon.

(b) Maritime instructions and notices. When storm warnings are received at the coastal stations, they will be immediately transmitted, and will be repeated from the Choshi station at 9.5 p.m., from the Fukkikaku station at 8.30 p.m., and from the Dairenwan station at 9 p.m.

Wavelengths of 600 metres are employed, and the storm warnings are continued three times after the signal "QST" has been thrice repeated.

NOTIFICATION OF THE DEPARTMENT OF COMMUNICATIONS NO. 1,105.

From December 11th, 1916, the following procedure for announcing central standard time at 1200-1204 (G.M.T.) by wireless telegraphy was adopted at the Choshi and Funabashi wireless telegraph stations:—

Procedure for Time Signalling by Wireless Telegraphy.

1. Every evening, with the exception of Sundays, Time Signals are automatically made by the transmitting apparatus at the Choshi and Funabashi wireless telegraph stations, as communicated by the Tokyo Observatory through the connected telegraph wires on land. The wavelength of 600 metres is used in the case of the Choshi station and that of 4,000 metres in the case of the Funabashi station.

The time to be signalled in accordance with the above is indicated five times—*viz.*, at 9.0 p.m. (Central Japan Standard Time), 9.01, 9.02, 9.03, and 9.04 (1200-1204 G.M.T.) by means of dashes continuing for one second from the times mentioned, and following the various warning signals distinguished as below :—

(a) The first warning signal, consisting of dashes, will commence at 8.59 p.m., and continue till 8.59.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

(See table below) :—

	Secs.	0	5	10	15	20	25	30	35	40	45	50	55	0
	h.													h.
a	0859	—	—	—	—	—	—	—	—	—	—	—	—	0900
b	0900													0901
c	0901													0902
d	0902													0903
e	0903													0904

(b) The second warning signal, consisting of a long dash and a dot, will commence at 9.00.30 and continue till 9.00.55, after which a suspension of five seconds will be followed by a dash continuing for one second.

(c) The third warning signal, consisting of a dash and two dots, will commence at 0901.30 and continue till 0901.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

(d) The fourth warning signal, consisting of a dash and three dots, will commence at 0902.30, and continue till 0902.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

(e) The fifth warning signal, consisting of a dash and four dots, will commence at 0903.30, and continue till 0903.55, after which a suspension of five seconds will be followed by a dash, continuing for one second.

JUGO-SLAVIA

A meteorological report is issued daily from Belgrade (HFB) at 1345 (G.M.T.).

MALTA

A meteorological message is issued daily at 0900 and 2100 (G.M.T.) by Rinella (BYZ) Wireless Telegraph Station ; wavelength 4,200 C.W.

MAURITIUS

Time Signals are radiated daily by the Mauritius Wireless Station at 9 a.m. and p.m. (G.M.T.) to 9.1 a.m. and p.m. on a wavelength of 2,000 metres Spark, but the times are stated to be not perfectly accurate. The procedure adopted is :—N's made by hand every ten seconds, commencing at 0859 and concluding with a dash at 0900. G's made by hand every ten seconds, commencing at ten seconds past 0900, concluding with a dash operated from Observatory at 0901.

MEXICO

The coast stations of Campeche, Guaymas, Mazatlan de Sinaloa, Payo Obispo and Vera Cruz transmit the time of the meridian of Tacubaya (6 h. 36 m. 46.67 secs. behind Greenwich) daily at noon in the following manner :—

From 11.55 a.m. to noon : repeated transmission of the inquiry signal "CQ" ; then repeated transmissions of the signal "XH" (time of Tacubaya) ;

At noon : transmissions of the word " noon," always followed by a free announcement of the state of the weather.

NETHERLANDS

Since July 1st, 1915, the station of Scheveningen Harbour has been sending at 11.15 and 23.15 (Greenwich time) on a wavelength of 1,800 metres a meteorological radiotelegram in Dutch and English, followed by a storm signal whenever necessary and also a notice to mariners in Dutch and English.

The meteorological radiotelegram is preceded by the letters KNMI, and consists of four sets of two groups of five figures each for the stations Helder, Flushing, Gris Nez, and The Hague, and, further, of four sets of two groups wherein one group has five and the other group four figures each for the stations Yarmouth, Shields, Skudnaes and Sylt, according to the scheme.

BBBDD FWTT(S).

The letter x is used to denote missing figures.

Following the above comes, if deemed important, first, the storm signal—*e.g.*, warning signal, signal of shifting south-east storm ; second, the notice to mariners, preceded by the letters NBAZ—*e.g.*, wreck, mouth Hook of Holland.

Examples of meteorological radiotelegrams from the first and the fifth of the eight sets of two groups KMNI are 69010-21541 and 57316-4405 ; their translations follow :—

HELDER.	YARMOUTH.
Barometer, 769.0 mm.	Barometer, 757.3 mm.
Wind direction, E.S.E.	Wind direction, south.
Wind force, very light.	Wind force, moderate.
Sky, slightly cloudy.	Sky, overcast.
Temperature, 4° C.	Temperature, 5° C.
Sea, very smooth.	

Meteorological reports are also issued from Soesterberg at 0820, 1020 and 1420 (G.M.T.) since May, 1920, giving information for Helder (01), Flushing (02) and de Bilt (03) in the code BBBDD FWTTV.

NEW ZEALAND

(See Australasia.)

NORWAY

Meteorological Reports are issued according to the following scheme from Christiania :—

Length of wave	..	..	..	8,000 metres (C.W.)
Call signal	..	..	..	LCH
Normal range	..	..	..	1,100 km.
Hour of sending	..	..	..	0845 (G.M.T.)
" "	..	..	..	1550 "
" "	..	..	..	2010 "
Hour of observation	..	..	..	0700 "
" "	..	..	..	1300 "
" "	..	..	..	1800 "

List of observation stations and their identification numbers and positions :—

Identification Number.	Place.	Latitude.	Longitude.
01	Vardö	70° 22'	31° 08'
02	Spitzbergen	78° 02'	14° 14'
03	Tromsø	69° 39'	18° 58'
04	Bodo	67° 17'	14° 24'
05	Bronno (Bron Is)	65° 28'	12° 13'
06	Christiansund	63° 07'	07° 45'
07	Floro	61° 36'	05° 02'
08	Skudenes	59° 09'	05° 16'
09	Okso	58° 04'	08° 04'
10	Faerder	59° 02'	10° 32'

Each radiogram begins with the words: Met. Norwegian. The code for the 0700 observations is :—

BBBDD FWTC cbbRR

The code for the 1300 and 1800 observations is :—

BBBDD FWTTk cbbrr

in which *k* gives the weather since the last observation according to the code.

0—Clear without precipitation.

1—Half-covered without precipitation.

2—Overcast

3—Fog

4—Storm

5—Rain (snow) showers, sky partly covered (days on which there are gleams of sunshine).

6—Sky overcast with rain (snow), occasional showers.

7—Incessant fog, mist, fine rain (slight snowfall).

8—Rain (snow) continuous with a few breaks, no gleams of sunshine.

9—Incessant rain (snow).

r—Indicates the time of commencement of the precipitation according to the code.

O—No precipitation since 7 (13) o'clock.

1—Precipitation began between 7 and 8 (13 and 14) o'clock.

2 " " 8 9 (14 15) "

3 " " 9 10 (15 16) "

4 " " 10 11 (16 17) "

5 " " 11 12 (17 18) "

6 " " 12 13 o'clock (does not apply in the evening reports).

7 " " before 8 a.m. (13 p.m.).

8 " " hour unknown.

9—Not known whether there was precipitation or not. In cases where the precipitation was in the form of showers the time when the first shower started should be given, and

s—Indicates the time the precipitation ceased according to the code.

o—No precipitation since 7 (13) o'clock.

International Time and Weather Signals

1—Precipitation ceased between 7 and 8 (13 and 14) o'clock
2 " " 8 9 (14 15) "
3 " " 9 10 (15 16) "
4 " " 10 11 (16 17) "
5 " " 11 12 (17 18) "
6 " " 12 13 o'clock (does not evening report).

7 " " still continuing at 13 (18) o'clock a.m. (p.m.)
8—Hour of ceasing unknown.

9—Not known whether there was precipitation or not. In cases where precipitation was in the form of showers the time when the last shower should be given.

N.B.—The figures 8 and 9 for r and s are to be used in cases only.

Example of Radiograms :—

Met. Norv. 03 56216 31522 00000 05 54702 60072 0
47612 22042 01000 07 46708 54952 50500 08 453
00000 09 47806 56015 20311 10 52008 46013 0010

1300 Telegram.

Met. Norv. 0107 64670 52543 10100 0207 56064 443
0407 55910 21012 00000 01 57566 50530 32000
04532 30800 03 44616 43510 32000 04 44560 210
05 43962 44032 51200 06 43500 03021 00000 07 46
51000 08 47310 37035 00011 09 50422 23036 21014
610036 40313.

In the above telegram the morning observations from Vardö (02) and Bodö (04) are missing. These morning observations will be found in the 1300 telegram after the groups 0107, 0207 (which indicate Vardö, Spitzbergen and Bodö at 0700).

PANAMA

(See United States.)

PHILIPPINE ISLANDS

Time Signals are transmitted from Manila to every Telegraph station over the country by land lines every day at 1100 a.m. (0300 G.M.T.) clock of the Central Observatory, which is connected with the Posts telegraph office at Manila by a land line, is connected with the circuit at 10.55 a.m. Time signals are then sounded. In the minute before 11.00 a.m. the operator at the central office dots with during 20 seconds to indicate that it is the half half minute. They are omitted in order to give a chance to adjust instruments to the final corrected time. Then, at the expiration of the 10 seconds, a dash is given, thus completing the time and correcting the clocks in the country.

The wireless stations at Malabang and Cuyo broadcast Manila transmitted to them from Manila by land lines, every day at 11 a.m. (0300 G.M.T.). The radio station of the Navy Department at Cavite broadcasts time signals at 11.00 a.m. and 10.00 p.m. daily (0255-1355-1400 G.M.T.) on wavelengths of 952 m. (Spark) and 5,000 m. Weather warnings are sent immediately after the time signals.

Weather reports are exchanged regularly between the observatory at Manila and that of Guam, via the Naval radio station at Cavite. Warnings are also sent to Hanoi, French Indo-China, via Cavite. In the near future weather warnings will also be broadcasted station at Batangas.

- 1—Precipitation ceased between 7 and 8 (13 and 14) o'clock.
 2 " " " 8 9 (14 15) "
 3 " " " 9 10 (15 16) "
 4 " " " 10 11 (16 17) "
 5 " " " 11 12 (17 18) "
 6 " " " 12 13 o'clock (does not apply to evening report).
 7 " still continuing at 13 (18) o'clock a.m. (p.m.).
 8—Hour of ceasing unknown.
 9—Not known whether there was precipitation or not. In cases where precipitation was in the form of showers the time of ceasing of the last shower should be given.

N.B.—The figures 8 and 9 for r and s are to be used in exceptional cases only.

Example of Radiograms :—

Met. Norv. 03 56216 31522 00000 03 54762 60052 00000 06
 47612 22042 01000 07 46708 54052 50500 08 45308 76034
 00000 09 47806 56015 20311 10 52008 46013 00199

1300 Telegram.

Met. Norv. 0107 64670 52543 10100 0207 56064 44509 70300
 0407 55910 21012 00000 01 57566 50530 32000 02 47800
 04532 30800 03 44616 43510 32000 04 44560 21020 31000
 05 43962 44032 51200 06 43500 03021 00000 07 46024 23032
 51000 08 47310 37035 00011 09 50422 23036 21014 10 46620
 610036 40313.

In the above telegram the morning observations from Vardö (01), Spitzbergen (02) and Bodö (04) are missing. These morning observations will be found in the 1300 telegram after the groups 0107, 0207 and 0407 (which indicate Vardö, Spitzbergen and Bodö at 0700).

PANAMA

(See United States.)

PHILIPPINE ISLANDS

Time Signals are transmitted from Manila to every Telegraph Station all over the country by land lines every day at 1100 a.m. (0300 G.M.T.). The clock of the Central Observatory, which is connected with the Bureau of Posts telegraph office at Manila by a land line, is connected to the telegraph circuit at 10.55 a.m. Time signals are then sounded. In the last half minute before 11.00 a.m. the operator at the central office dots with the key during 20 seconds to indicate that it is the half half minute. Ten seconds are omitted in order to give a chance to adjust instruments to receive the final corrected time. Then, at the expiration of the 10 seconds, a long heavy dash is given, thus completing the time and correcting the clocks in all offices.

The wireless stations at Malabang and Cuyo broadcast Manila time, transmitted to them from Manila by land lines, every day at 11 a.m. (0255-0300 G.M.T.). The radio station of the Navy Department at Cavite also broadcasts time signals at 11.00 a.m. and 10.00 p.m. daily (0255-0300 and 1355-1400 G.M.T.) on wavelengths of 952 m. (Spark) and 5,000 m. (arc.). Weather warnings are sent immediately after the time signals.

Weather reports are exchanged regularly between the observatory at Manila and that of Guam, *via* the Naval radio station at Cavite. Weather warnings are also sent to Hanoi, French Indo-China, *via* Cavite.

In the near future weather warnings will also be broadcasted from the station at Batangas.

POLAND

The Warsaw Central Station transmits press and meteorological reports at 10 a.m., 5.30 p.m., and at midnight (0840, 1530, 2200 G.M.T.). (Call signal WAR, Wavelength 2,000 m.). The code used for the meteorological report is as follows:—

For 0700 reports NN BBBDD FWTTTC cbb RR MMmm where NN stands for the station number

and the observations are sent for 01 Posen, 02 Warsaw, 03 Vilna, 04 Lodz, 05 Lublin, 06 Cracow, 07 Tarnow, 08 Lemberg, 09 Ronne, 10 Pinsk, 11 Zakopane, 12 Konitz, 15 Hela, 17 Rixhofs, 18 Puck, 19 Dantzig.

Upper wind reports are added in a letter code identical with that used for reports from the Eiffel Tower (France), *q.v.*

PORTUGUESE EAST AFRICA

Time signals are sent out twice daily from Lourenço Marques at 7.57 to 8 a.m., and 6.57 to 7 p.m. (G.M.T.), on a wavelength of 600 metres following the system of the Eiffel Tower Ordinary 10 a.m. Time Signal, *q.v.*

Following every time signal, a local weather report is transmitted in English as follows:—

CRZ Weather Report—at 8 a.m. G.M.T. (or 7 p.m. G.M.T.).
Pressure at sea level 760.5 millimetres, wind E.N.E. strong, sea rough.
Campos Rodrigues Observatory, Lourenço Marques.

PUERTO RICO

The San Juan Station is used for collecting meteorological data from the adjacent American Islands of the West Indies and from Cuba, and this information is, in turn, transmitted to the United States *via* the high power station at El Cayey, Puerto Rico.

ROUMANIA

A meteorological report is issued once daily from Bucharest (BNS) at 1400 (G.M.T.?) on a wavelength of 4,000 or 7,000 m.

SAMOA

Local weather bulletins, preceded by the letter T are broadcasted by the Tutuila Naval Radio Station (NPU) at 8 a.m., noon, 4 p.m., and 8 p.m.

SOUTH AFRICA

The radiotelegraphic stations at Capetown (Slangkop) and Durban signal at 1.15 o'clock in the afternoon of each day (1115 G.M.T.) weather reports containing information relative to the meteorological conditions affecting the coastal belt of the South African Union.

The arrangements made in the Union of South Africa for the transmission of radio time signals for the use of shipping in South African waters is as follows:—

A special clock at the Royal Observatory, Capetown, is adapted to give automatically a series of signals of a distinctive character extending over an interval of half a minute. The clock is brought into conformity daily with the observatory standards shortly before the hour selected for transmitting the signals. The hour chosen is 11 p.m., Union standard time (9 p.m. G.M.T.).

The time signal is preceded by the usual warning signal from the radio coast station. The time signal proper consists of twelve dashes, each of about $\frac{1}{4}$ of a second in duration, in five groups, commencing at the following Greenwich mean times:—

RADIOTELEGRAM AT 1530 H.

This will contain the observations made at 13 h. (G.M.T.) at the same stations mentioned for the previous radiotelegram, and drawn up in the same manner.

Next appears a group of nine signs which express the state of the sea on our coasts, in conformity with the following rule: the first sign from the left indicates the state of the sea on that part of the coast comprised between San Sebastián and Santander; the second between Santander and Cape Estaca de Vares; the third between Cape Estaca de Vares and the Portuguese frontier; the fourth between Huelva and Gibraltar; the fifth between Gibraltar and Almería; the sixth between Almería and Valencia; the seventh between Valencia and the French frontier; the eight in the Balearic Isles; and the ninth in Argelia.

This is followed by a group of eleven signs, indicating the probable weather for the following twenty-four hours: the first sign from the left indicates the probable weather in the regions of Galicia, Asturias and León, giving preference to that concerning the coast; the second corresponds to the provinces of Santander, Vizcaya and Guipúzcoa, likewise giving preference to the phenomena most interesting to navigators; the third, the weather which will be experienced in the central part of Spain, the provinces of Burgos, Palencia, Navarra, Logroño, Valladolid, Soria, Zaragoza, Zamora, Segovia, Guadalajara, Salamanca, Avila, Madrid, Teruel, Cáceres, Toledo, Cuenca, Badajoz, Ciudad Real, and Albacete, giving preference to the kinds of weather interesting to agriculturists; the fourth, the probable weather in the north-eastern part of Spain, provinces of Huesca, Lérida, Gerona, Barcelona and Tarragona, in its part which most interests farmers and navigators; the fifth, the weather in Levante: provinces of Castellón, Valencia, Alicante, and Murcia, in the part which interests farmers and navigators; the sixth, the weather in Andalusia: provinces of Córdoba, Sevilla, Huelva, Cádiz, Málaga, Jaén, Granada and Almería, giving preference to the weather interesting agriculturists; the seventh, the weather in the Straits of Gibraltar and north part of Morocco, giving preference to weather interesting navigation; the eighth, the weather in the Balearic Isles and in the adjacent zone in the Mediterranean, giving preference to weather interesting navigation; the ninth, in the English Channel and Northern Cantábrico; the tenth corresponds to the part of the Atlantic near to Portugal; and the eleventh to the Canaries. Naturally, the limits of these zones cannot be perfectly defined, and it therefore remains for those who may make use of these services to discriminate, according to circumstances, whether the prognostication of one or other of the immediate regions is to be taken into account.

When, owing to lack of telegrams or other circumstances, the weather cannot be predicted as regards a specific district, the letter X will be substituted for the corresponding sign.

When it is required to signal the position of a cyclonic centre or line of squall (Grain) dangerous to navigation or aviation, the word "precaución" will be transmitted, and afterwards groups of six signs, which, if they refer to cyclonic centres, will commence with CI, and be followed by the group nnLLBB, in which the first two, nn, will indicate the latitude of the centre expressed in complete degrees; the third and fourth, LL, the geographical longitude also of the said centre to the east or to the west of the Meridian of Greenwich, expressed in complete degrees, those of the west, 01, 02, 03, etc., and those of the east by 51, 52, 53, etc.; the fifth and sixth signs, BB, will give the number representing the atmospheric pressure in millibars, omitting the hundreds. If it is a line of squall, it will be given in groups of eight signs, preceded by Gr, and followed by IILLBBDD, the first four, IILL, indicating the position of the point of the line at which the barometer is the lowest; the fifth and sixth, the atmospheric pressure at this point in millibars, and without hundreds; and the last two, DD, the direction of the line of squall at 13 h.

When a regular service of storm signals is established at ports, there will be indicated by a group of ten figures those signals which it is necessary to establish at different parts of our coasts. The successive signs will correspond to the parts of the coast as indicated below : 1, Cantabrian Coasts from Cape Higuer to Cape Mayor ; 2, from Cape Mayor to Cape Estaca de Vares ; 3, Galician Coast from Cape Estaca de Vares to the Portuguese frontier ; 4, from Cape Creus to Cape San Antonio ; 5, Balearic Islands ; 6, from Cape San Antonio to Cape Gata ; 7, Cape Gata to the Straits of Gibraltar ; 8, Straits of Gibraltar to the Portuguese frontier ; 9, East Coast of Africa (Tánger-Arcila) ; 10, Canaries.

RADIOTELEGRAM OF 2030 H.

This will contain observations made at 18 h. at the stations 1, 2, 3 and 4 of the previous radiotelegrams expressed in the form indicated above.

GENERAL REMARKS APPERTAINING TO RADIOTELEGRAMS.

When the results of a meteorological station do not arrive at Carabanchel in time for transmission, the initial of the name of such station will be placed at the corresponding place in the radiotelegram with the words " no llegó " (not arrived).

If one or more of the groups of the station should be lacking, XXXXX will be substituted for each one of them.

If the soundings have not been made by the station, it will be sufficient to suppress the corresponding groups.

If the soundings have been made but are incomplete, XXXX will be substituted for the group or groups which are missing.

Regarding stations shown in the radiotelegrams which are situated on the coast, only particulars of the state of the sea can be given with precision for San Fernando, La Coruna and Mahón ; therefore for the others the fifth figure of its fourth group will express the state of visibility of the horizon. (See instructions.)

The particulars regarding the state of the sea which are shown in a special group in the radiotelegram of 15.30 h., are those received from semaphores and certain vessels.

SWEDEN

Meteorological reports are issued twice daily from the radio station at Karlsborg on a wavelength of 2,500 m. (C.W.) at 0850 and 1930 (G.M.T.), giving observations made at 0700 and 1800 (G.M.T.).

Messages begin with the words *Meteo Suede* and the following index numbers are used.

01 Stockholm	05 Karlstad
02 Hernosand	06 Saerna
03 Haparanda	07 Storlieu
04 Wisby	08 Jonkoping

The observations at 0700 are issued in the code

BBBDD FWTTT cbbRR MMmmS

except for Saerna and Jonkoping, which use the code

BBBDD FWTTT T¹T¹T¹RR MMmmS
(T¹T¹T¹=wet bulb).

The observations at 1800 are issued in the code

BBBDD FWTTW¹ cbb99

At the end of the 0700 reports upper winds at Stockholm will be given in the code

D₁D₁V₁V₁D₂ D₂V₂V₂D₃D₃ V₃V₃D₄, etc.

for heights of 500, 1,000, 1,500, 2,000, 3,000, 4,000 m., direction being given in points (1-32) and speed in metres per second.

TURKEY

Weather reports are issued three times daily from Constantinople (OSM) at 0515, 0845, 1545 (G.M.T.?).

UNITED KINGDOM

Collective data messages are issued four times daily, according to the following scheme. These messages are intended to give information necessary for the preparation of weather maps.

AIR MINISTRY.

Call sign	..	..	..	..	GFA
Wavelength	..	..	..	..	1,400 m. (c.w.)
Times of issue (G.M.T.)	..	..	..	..	0205
"	"	"	"	"	0805
"	"	"	"	"	1405
"	"	"	"	"	1905

ABERDEEN.

Call sign	..	..	..	..	BYD
Wavelength	..	..	..	..	3,300 m.
Times of issue (G.M.T.)	..	..	..	..	0230
"	"	"	"	"	0830
"	"	"	"	"	1430
"	"	"	"	"	1930

Reports will be sent for the following stations:—

Place.	Identification Number.	Place.	Identification Number.
Lerwick	101	Scilly	166
*Aberdeen	110	Pembroke	169
Tynemouth	118	Holyhead	174
*Manchester (Didsbury)	128	*Glasgow	178
*Cranwell	131	Malin Head	182
Yarmouth	136	*Baldonnel	184
*Felixstowe	143	*Valencia	192
*Calshot	153	Stornoway	195
*Lympe	154	Ross-on-Wye	198
Croydon	159	Blacksod Point	199
Jersey	160		

The identification number of each station will be followed by three groups of five figures, represented symbolically by:—

BBBDD FwwTT cbbHV

where BBB = Barometer in millibars and tenths (initial 9 or 10 omitted).

DD = Wind direction at surface on the scale 0-32 (08 = E., 16 = S., 20 = S.W., etc.).

F = Wind force on Beaufort Scale.

w = Present weather.

TT = Temperature in degrees Fahrenheit.

c = Characteristic of barometric tendency.

bb = Amount of barometric tendency in half millibars (50 added for negative tendency).

H = Humidity.

V = Surface visibility.

International Time and Weather Signals

A hyphen - (Morse signal — • • • —) will be used in the any missing figure.

In the case of stations marked * a fourth group will be added, as follows:—

2 DDVV

where DD = Direction of wind at 2,000 feet on the scale. Actual direction in degrees from North is by multiplying code figures by 5.

VV = Speed of wind at 2,000 feet in miles per hour.

The necessary codes are given on pp. 1045-1047.

In addition to these data messages an inference stating in plain what the general trend of wind and weather is likely to be, is issued from G.F.A. at 0915 and 2015 (G.M.T.) daily.

HOURLY REPORTS.

Hourly reports are issued at 35 minutes past each hour from 07 (G.M.T.) by W/T as follows:—

Call sign	..	..	..	GFA.
Wavelength	..	..	..	1680 m. (c.w.)

After the call sign GFA comes the word "METEOR," in which a meteorological message is being transmitted. This is followed by a four-figure group, giving the hour (G.M.T.) at which the observation was made: this time group is in turn followed by station index letters, groups giving the conditions at the following stations:—

Index Letters.	Station.
FXT	
CDN	Felixstowe.
BGL	Croydon.
LMP	Biggin Hill.
BCD	Lympe.
DNS	Beachy Head.
BOTLEY	Dungeness.
	Botley Hill (North Downs).

The letters DNS, when included, will be followed by a figure as the last figure of the fourth group of the report for LMP (Lympe) as the last figure of the fourth group of the report for BCD (Beachy Head).

The word "BOTLEY" is followed by a statement in plain language of the conditions on the North Downs as viewed from Biggin Hill, with a statement adds material information to that contained in the report message.

At the end of the message a short forecast is given in plain language of the changes in the weather conditions anticipated in the period of following the time of issue.

This begins with the word "FORECAST."

If there is no reason to modify the forecast sent in the preceding words "Forecast unaltered" are sent.

The complete results of a pilot balloon ascent at Croydon or when available, are inserted immediately before the forecast.

This part of the message is preceded by the index letters of the and by the five-figure index group 49860.

A hyphen - (Morse signal — • • • —) will be used in the place of any missing figure.

In the case of stations marked * a fourth group will be added when possible, as follows —

2 DDVV

where DD = Direction of wind at 2,000 feet on the scale 0-72.
Actual direction in degrees from North is obtained by multiplying code figures by 5.

VV = Speed of wind at 2,000 feet in miles per hour.

The necessary codes are given on pp. 1045-1047.

In addition to these data messages an inference stating in plain language what the general trend of wind and weather is likely to be, is issued by W/T from G.F.A. at 0915 and 2015 (G.M.T.) daily.

HOURLY REPORTS.

Hourly reports are issued at 35 minutes past each hour from 0735 to 1635 (G.M.T.) by W/T as follows:—

Call sign	..	..	..	..	GFA.
Wavelength	..	..	..	..	1680 m. (c.w.)

After the call sign GFA comes the word "METEOR," indicating that a meteorological message is being transmitted. This is followed by one four-figure group, giving the hour (G.M.T.) at which the observations were made: this time group is in turn followed by station index letters and figure groups giving the conditions at the following stations:—

Index Letters.	Station.
FXT	Felixstowe.
CDN	Croydon.
BGL	Biggin Hill.
LMP	Lympne.
BCD	Beachy Head.
DNS	Dungeness.
BOTLEY	Botley Hill (North Downs).

The letters DNS, when included, will be followed by a figure giving the Channel visibility at Dungeness. The channel visibility at *Hythe* is given as the last figure of the fourth group of the report for LMP (Lympne), and the channel visibility at Beachy Head is given as the last figure of the fourth group of the report for BCD (Beachy Head).

The word "BOTLEY" is followed by a statement in plain language of the conditions on the North Downs as viewed from Biggin Hill, when such a statement adds material information to that contained in the rest of the message.

At the end of the message a short forecast is given in plain language of the changes in the weather conditions anticipated in the period of daylight following the time of issue.

This begins with the word "FORECAST."

If there is no reason to modify the forecast sent in the preceding message the words "Forecast unaltered" are sent.

The complete results of a pilot balloon ascent at Croydon or Lympne, when available, are inserted immediately before the forecast.

This part of the message is preceded by the index letters of the station and by the five-figure index group 49860.

The groups following the index group are in the form HDDVV, where H is the height according to the scale of the International Convention for Aerial Navigation, viz. :—

1	refers to a height of	200 metres or	500 feet
2	"	"	500 "
3	"	"	1,000 "
4	"	"	1,500 "
5	"	"	2,000 "
6	"	"	3,000 "
7	"	"	4,000 "
8	"	"	5,000 "

DD is the direction of the wind on the scale 0-72 at the height H.
VV is the speed of the wind in miles per hour.

The following is a specimen message :—

GED	Meteor	0900 G.M.T.	
CDN	20354	60003	05656 24728
BGL	21454	00001	77624 6---
LMP	21555	79512	05655 24940
BCD	22665	70001	43815 5754

BOTLEY in clouds.

FORECAST. Wind changing to west after noon, cloud lifting and visibility improving afterwards.

The information contained in the messages should be entered after decoding in a suitable form.

- I. If any figures are missing, a hyphen or dash is transmitted in place of each missing figure.
- II. When the upper wind at 2,000 feet is not available at any station, the group for upper wind at that station is omitted from the message. Similarly for inland stations the group $h_1S_1SV_1$ is omitted altogether when there is no cloud below 1,000 feet.

CODES.

Symbolically the code for the individual stations is as follows :—

DDFD₁F₁ ALEMH wwWWV $h_1S_1SV_1$ $2D_2D_2VV$

Where the letters have their usual significance (see pp. 1045-1047), but height of base of low cloud below 1,000 feet is as follows :—

1—Cloud below	50 metres	or 150 feet (nearly)
2—Cloud between	50 metres and 100 metres	or 150 and 350 feet
3—	100 " "	150 " " 350 " 500 "
4—	150 " "	200 " " 500 " 650 "
5—	200 " "	250 " " 650 " 800 "
6—	250 " "	300 " " 800 " 1,000 "

FORECASTS.

Forecasts are issued daily by wireless as follows :—

Time of Issue.	Period of Forecasts.	Area.	Station and Wavelength.
0100	Following 24 hours.	North Sea	Cleethorpes.
		56° N. to 60° N.	3,000 m.
0500	Following 12 hours.	North Sea.	Cleethorpes.
			3,000 m.
0700	Following 24 hours.	West and South-West Coasts.	Poldhu.
			2,700 m.
1030	Following 24 hours.	Sea.	Cleethorpes.
		60° N. to 64° N.	3,000 m.
1700	Following 12 hours.	North Sea.	Cleethorpes.
			3,000 m.

GALE WARNINGS.

Gale warnings are issued by W/T from the following stations, length of 600 m. whenever an atmospheric disturbance is developing which is likely to cause a gale (Beaufort force 8) at sea within 150 miles of the issuing station :—

Malin Head	GMH	Seaforth
Valentia	GCK	Niton
Land's End	GLD	Wick
Fishguard	GRL	Cullercoats

UNITED STATES OF AMERICA

TRANSMISSION OF TIME SIGNALS AND HYDROGRAPHIC

NAVAL RADIO STATIONS.

The transmission of time signals to vessels at sea by radio telegraphy was first accomplished in the United States in 1896. The service, enlarged and extended, has continued to the present time, as given by the transmitted signals, may be compared with a chronometer and the error of the chronometer found. Similar over a number of days enable data to be obtained by which not only may be found but also the chronometer rate; that is, the rate of gaining or losing.

The noontime signals on the Atlantic coast are sent out through coast radio stations by connection with Western Union Telegraph Company. The United States Naval Observatory at Washington, D.C. By the proper relays in electrical circuits, the beats of the seconds of a standard time, as given by the transmitted signals, may be compared with a chronometer and the error of the chronometer found. Similar over a number of days enable data to be obtained by which not only may be found but also the chronometer rate; that is, the rate of gaining or losing.

Time signals are now sent out on the Atlantic coast only through radio stations at Washington (NAA), Annapolis (NSS), Key West and New Orleans (NAT). Signals from Washington, Annapolis and West are sent out every day in the year twice a day, viz., from 11.55 noon, and from 9.55 to 10 p.m., seventy-fifth meridian time. Time from New Orleans are sent out daily, including Sundays and holidays, commencing at 11.55 a.m., seventy-fifth meridian standard time, and ending at 11.55 p.m., seventy-fifth meridian standard time.

On the Pacific coast the time signals are sent broadcast to sea through the naval radio stations at San Francisco (NPH), Eureka (NPW), Arguello (NPK), and San Diego, Calif. (NPL), and at North Head (NPE). The controlling clock for each station is in the naval observatory at the Mare Island Navy Yard. Signals from all these stations are sent every day from 11.55 to noon, one hundred and twentieth meridian time, but point Arguello, and San Diego do not send on Sundays and holidays.

On the Great Lakes the time signals are sent broadcast through radio station at Great Lakes, Ill. (NAJ), daily, except on Sundays and days, from 10.55 a.m. to 11 a.m., ninety-fifth meridian standard time. To get the maximum clearness of signals, the receiving circuit is tuned to that of the sending station. The wavelengths used are :—

Annapolis	17,000 metres.
Washington	2,500 metres.
San Francisco	2,400 and ..

GALE WARNINGS.

Gale warnings are issued by W/T from the following stations on a wavelength of 600 m. whenever an atmospheric disturbance is approaching or developing which is likely to cause a gale (Beaufort Force 8) in the open sea within 150 miles of the issuing station :—

Malin Head	GMH	Seaforth	GLV
Valentia	GCK	Niton	GMI
Land's End	GLD	Wick	BYG
Fishguard	GRL	Cullercoats	GCC

UNITED STATES OF AMERICA

TRANSMISSION OF TIME SIGNALS AND HYDROGRAPHIC INFORMATION BY NAVAL RADIO STATIONS.

The transmission of time signals to vessels at sea by means of radiotelegraphy was first accomplished in the United States in 1905, and this service, enlarged and extended, has continued to the present time. This service is of the greatest value to mariners, as it furnishes a means by which the time, as given by the transmitted signals, may be compared with a ship's chronometer and the error of the chronometer found. Similar comparisons over a number of days enable data to be obtained by which not only the error may be found but also the chronometer rate; that is, the rate at which it is gaining or losing.

The noontime signals on the Atlantic coast are sent out through the coast radio stations by connection with Western Union Telegraph lines from the United States Naval Observatory at Washington, D.C. By the operation of proper relays in electrical circuits, the beats of the seconds of a standard clock in the observatory are sent out broadcast as a series of radio dots, commencing five minutes before the time of the final signal. By omitting certain dots in a series, the comparison between the dots and the beats of the chronometer seconds can be checked until the instant of local noon (seventy-fifth meridian time) is reached. This is marked by a longer dot, which gives the time of exact noon. A comparison with the chronometer time at that instant gives its error referred to the seventy-fifth meridian time. Applying the difference in longitude, namely five hours, between the seventy-fifth meridian and Greenwich, which is the standard meridian (or 0° longitude), the error of the chronometer referred to Greenwich time is determined.

Time signals are now sent out on the Atlantic coast only through the radio stations at Washington (NAA), Annapolis (NSS), Key West (NAR), and New Orleans (NAT). Signals from Washington, Annapolis and Key West are sent out every day in the year twice a day, *viz.*, from 11.55 a.m. to noon, and from 9.55 to 10 p.m., seventy-fifth meridian time. Time signals from New Orleans are sent out daily, including Sundays and holidays, commencing at 11.55 a.m., seventy-fifth meridian standard time, and ending at noon.

On the Pacific coast the time signals are sent broadcast to sea through the naval radio stations at San Francisco (NPH), Eureka (NPW), Point Arguello (NPK), and San Diego, Calif. (NPL), and at North Head, Wash. (NPE). The controlling clock for each station is in the naval observatory at the Mare Island Navy Yard. Signals from all these stations are sent out every day from 11.55 to noon, one hundred and twentieth meridian standard time, but point Arguello, and San Diego do not send on Sundays and holidays.

On the Great Lakes the time signals are sent broadcast through the naval radio station at Great Lakes, Ill. (NAJ), daily, except on Sundays and holidays, from 10.55 a.m. to 11 a.m., ninetyeth meridian standard time.

To get the maximum clearness of signals, the receiving circuit should be tuned to that of the sending station. The wavelengths used are as follows :—

Annapolis	..	..	..	17,000 metres.
Washington	..	..	..	2,500 metres.
San Francisco	..	..	..	2,400 and 4,800 metres.

North Head	..	..	..	2,800 metres.
San Diego	..	..	..	2,400 and 9,800 metres.
Eureka	..	..	..	2,000 metres.
Great Lakes	..	..	..	1,512 metres.
Key West	..	..	..	1,500 metres.
Point Arguello	..	..	..	1,512 metres.
New Orleans	..	..	..	1,000 metres.

Both San Francisco and San Diego transmit time signals on undamped waves simultaneously with the transmission on damped waves, using an arc transmitter in each case. The arc transmitter is far more powerful than the spark transmitter, and the signals should be audible over a much greater range. They can, of course, only be received on apparatus specially equipped to receive undamped signals.

PANAMA.

Time is transmitted by Balboa (Canal Zone), call letters NBA, at 12.55 to 1 p.m. and at 4.55 to 5 a.m., seventy-fifth meridian time, on 7,000 metres. Undamped waves are used, but so interrupted by a chopper as to be audible on a crystal detector.

Also time is transmitted by Colon (Canal Zone), call letters NAX, at the same times, on 1,500-metre spark.

In this connection it will be noted that Darien has been operated by distant control from Balboa. The station is called Balboa, and the call NBA is used for both.

At 1 p.m. daily, seventy-fifth meridian time, a time-ball is dropped from the top of the mast on the Signal Station on Sosa Hill, Balboa.

The following table summarises the issues in a convenient form :—

Station.	Call Letters.	Wave-Lengths.	When sent.
		Metres.	
Washington	NAA	2,500	Daily at 11.55 a.m. to noon and 9.55 p.m. to 10.00 p.m., standard time, 75th meridian. 0255-0300, 1655-1700 G.M.T.
Annapolis	NSS	17,000 (arc)	Daily at 11.55 a.m. to noon and 9.55 p.m. to 10.00 p.m. standard time, 75th meridian. 0255-0300, 1655-1700 G.M.T.
Key West	NAR	1,500	Daily at 11.55 a.m. to noon, standard time, 75th meridian. 1655-1700 G.M.T.
New Orleans	NAT	1,000	Daily at 11.55 a.m. to noon, standard time, 75th meridian. 1655-1700 G.M.T.
Balboa, Panama ..	NBA	7,000 (arc)	Daily at 4.55 to 5.00 a.m. and 12.55 to 1.00 p.m., standard time, 75th meridian. 0955-1000, 1755-1800 G.M.T.
Colon, Panama ..	NAX	1,500 (spark)	Daily at 4.55 to 5.00 a.m. and 12.55 to 1.00 p.m., standard time, 75th meridian, 0955-1000, 1755-1800 G.M.T.
Cavite, Philippines ..	NPO	952 (spark) 5,000 (arc)	Daily at 10.55 to 11.00 a.m. and 9.55 to 10.00 p.m., standard time, 120th meridian, East. 0255-0300, 1355-1400 G.M.T.
North Head, Wash. ..	NPE	2,800	Daily at 11.55 a.m. to noon, standard time 120th meridian, West. 1855-1900 G.M.T.
Eureka, Calif. ..	NPW	2,000	Daily at 11.55 a.m. to noon, standard time, 120th meridian, West. 1855-1900 G.M.T.
Point Arguello, Calif.	NPK	1,512	Daily, except Sundays and holidays, at 11.55 a.m. to noon, standard time, 120th meridian, West. 1855-1900 G.M.T.
San Diego, Calif. ..	NPL	9,800 (arc) 2,400 (spark)	Daily, except Sundays and holidays, at 11.55 a.m. to noon, standard time, 120th meridian, West. 1855-1900 G.M.T.
San Francisco, Calif. ..	NPH	4,800 (arc) 2,400 (spark)	Daily at 11.55 a.m. to noon, standard time, 120th meridian, West. 0555-0600, 1955-2000 G.M.T.
Great Lakes, Ill. ..	NAJ	1,512	Daily, except Sundays and holidays, at 10.55 a.m. to 11.00 a.m., standard time, 90th meridian. 1555-1600 G.M.T.
Pearl Harbour, Hawaii	NPM	11,200 (arc) 600 (spark)	Daily at 180th meridian mean noon. 2355-2400 G.M.T.

HYDROGRAPHIC INFORMATION.

Information concerning wrecks, derelicts, ice, and other dangerous obstructions to navigation, whenever received from the Hydrographic Office or from a branch hydrographic office or other reliable source, is sent broadcast four times daily, viz., at 8 a.m., noon, 4 p.m., and 8 p.m., local (standard) time of station. Ships within range of a naval radio station should be prepared to receive these hydrographic messages at the hours mentioned and should avoid sending radio messages at these times. One vessel sending may prevent several others receiving information necessary to their safety.

Naval radio stations will furnish this information to passing vessels on request, whenever practicable, at other hours than those mentioned above. Should it not be practicable to send out this information at one of the hours scheduled it will be held until the next scheduled time and sent out as soon as practicable after each hour scheduled.

Each day at noon and at 10 p.m., seventy-fifth meridian, immediately following the time signal, the naval radio station at Washington, D.C., will send broadcast such information relating to safe navigation as may be furnished it by the Hydrographic Office during the preceding 24 hours. The same wavelength, 2,500 metres, used in the time signal will be employed.

INTERNATIONAL ICE OBSERVATION AND ICE PATROL SERVICE.

For the purpose of carrying on the International Ice Observation and Ice Patrol Service provided for by the International Convention for the Safety of Life at Sea, London, 1913-14, the U.S. Coastguard cutters *Ossipee* and *Seneca* have been detailed for this service.

The object of the Ice Patrol Service is to locate the icebergs and field ice nearest to the transatlantic steamship lane. It will be the duty of patrol vessels to determine the southerly, easterly, and westerly limits of the ice, and to keep in touch with these fields as they move to the southward, in order that radio messages may be sent out daily, giving the whereabouts of the ice, particularly the ice that may be in the immediate vicinity of the regular transatlantic steam lane.

During the months of April, May, and June, and as much longer as necessary, these two vessels will obtain fuel and other necessary supplies at Portland, Me., and Boston, Mass., respectively. They will alternate on patrol, making alternate cruises of about fifteen days in the ice region; the fifteen days to be exclusive of time occupied in going to and from base. The movements of the vessels will be so regulated that on the fifteenth day after reaching the ice region the vessel on patrol will be relieved by the second vessel, if possible, at which time the first vessel will proceed to base, replenish her coal supply, and return in time to relieve the other vessel at the end of the latter's fifteen-day cruise. It is important that the patrol be continuous, and the vessel on patrol will not leave her station until relieved by the other vessel unless it is absolutely necessary to do so.

Having located the ice, the patrol vessel will send the following daily radiograms. All time in radiograms will be in 75th meridian time.

- (a) At 6 p.m. (75th meridian time) ice information will be sent broadcast for the benefit of vessels, using 600 metre wavelength. This message will be sent three times, with an interval of two minutes between each.
- (b) At 4 a.m. (75th meridian time) a radiogram will be sent to the Branch Hydrographic Office, New York City, through the nearest land radio stations, defining the ice danger zone, its southern limits, or other definite ice news. The telegraphic address of the Branch Hydrographic Office is "Hydrographic, New York."
- (c) Ice information will be given at any time to any ship with which the patrol vessel can communicate.

Ice information will be given in as plain, concise English as practicable, and will state in the following order :—

- (a) Ice (berg or field).
- (b) Date.
- (c) Time (75th meridian time).
- (d) Latitude.
- (e) Longitude.
- (f) Other data as may be necessary.

While on this duty the patrol vessel will endeavour by means of daily radio messages to keep ships at sea advised of the limits of the ice fields, etc.

The radio messages from the patrol ships will be given publicity immediately upon their receipt by the Branch Hydrographic Office, New York, and by the Hydrographic Office, Washington, D.C.

TRANSMISSION OF WEATHER REPORTS BY NAVAL RADIO STATIONS.

Through co-operation with local offices of the United States Weather Bureau, weather forecasts are sent broadcast to sea through naval coast radio stations at certain times, varying with the locality. Coast stations are generally prepared to give local forecasts to passing vessels without charge, on request. Storm warnings are sent whenever received.

GENERAL REPORT.

A general report of weather conditions in America is understood to be issued or about to be issued twice daily from Annapolis (17,000 m.) at 0130 and 1330 G.M.T.

ATLANTIC COAST AND GREAT LAKES.

Daily weather bulletins are distributed by the naval radio stations at Washington, D.C., and Key West, Fla., a few minutes after the 10 p.m. time signal. These bulletins consist of two parts.

The first part contains code letters and figures which express the actual weather conditions at 8 p.m. (seventy-fifth meridian time), on the day of distribution, at certain points along the eastern coast of North America, one point along the Gulf of Mexico, and one at Bermuda.

The second part of the bulletin contains a special forecast of the probable winds to be experienced a hundred miles or so offshore, made by the United States Weather Bureau for distribution to shipmasters. The second part of the bulletin also contains warnings of severe storms along the coasts, whenever occasion arises.

Immediately following this bulletin, a weather bulletin for certain points along the Great Lakes is sent broadcast by the naval radio station at Washington, D.C., and by Great Lakes (NAJ). The first part contains code letters and figures which express the actual weather conditions at 8 p.m. (seventy-fifth meridian time), on the day of distribution at certain points along the Lakes. The second part of the bulletin contains a special forecast of the probable winds to be experienced on the Lakes.

The points for which weather reports are furnished are designated as follows: *For Atlantic coast and Gulf points*, S=Sidney, T=Nantucket, DB=Delaware Breakwater, H=Hatteras, C=Charleston, K=Key West, P=Pensacola, B=Bermuda; *for points on the Great Lakes*, Du=Duluth, M=Marquette, U=Sault Ste. Marie, G=Green Bay, Ch=Chicago, L=Alpena, D=Detroit, V=Cleveland, and F=Buffalo.*

All bulletins begin with the letters U S W B (United States Weather Bureau) and the weather conditions follow. The first three figures of a report represent the barometric pressure in inches (002=30.02); the next figure, the fourth in sequence, represents the direction of the wind to the eight points

of the compass : 1 = north, 2 = north-east, 3 = east, 4 = south-east, 5 = south, 6 = south-west, 7 = west, 8 = north-west, and 0 = calm. The fifth figure represents the force of the wind on the Beaufort Scale.

In order to simplify the code, no provision has been made for wind force greater than 9, strong gale, on the Beaufort Scale. Whenever winds of force greater than 9 occur, the number representing them is given in words of figures, thus : Ten, eleven, etc.

Examples of Code.

U S W B S 96465 T 91674 DB 94686 H 99886 C 01214 K 02622 P 03613
B 00065

Translation.

United States Weather Bureau.

Station.	Pressure.	Wind.	
		Direction.	Force.*
Sydney	29.64	SW	5
Nantucket	29.16	W	4
Delaware Breakwater	29.46	NW	6
Hatteras	29.98	NW	6
Charleston	30.12	N	4
Key West	30.26	NE	2
Pensacola	30.36	N	3
Bermuda	30.00	SW	5

* See Beaufort Scale.

U S W B Du 95826 M 97635 U 00443 G 96046 Ch 95667 L 00644
D 00842 V 01054 F 01656

Translation.

United States Weather Bureau.

Station.	Pressure.	Wind.	
		Direction.	Force.*
Duluth	29.58	NE	6
Marquette	29.76	E	5
Sault Ste. Marie	30.04	SE	3
Green Bay	29.60	SE	6
Chicago	29.56	SW	7
Alpena	30.06	SE	4
Detroit.. .. .	30.08	SE	2
Cleveland	30.10	S	4
Buffalo.. .. .	30.16	S	6

* See Beaufort Scale.

PACIFIC COAST

Weather bulletins are obtained from the Weather Bureau, San Francisco, by the San Francisco Naval Radio Station at about 8.30 a.m. and 6 p.m., and forwarded by radio to North Head and San Diego as soon as practicable. They are broadcasted by San Francisco, North Head, and San Diego at noon and 10 p.m. on 952 metres immediately after transmission of time signals. Hydrographic information and storm warnings are broadcasted immediately upon receipt by Tatoosh. Puget Sound, North Head, Marshfield, San Francisco, and Point Arguello on 600 and 952 metres in succession, and also after broadcasting local weather report. Local weather reports broadcasted by Tatoosh, North Head, San Francisco and San Diego at 8 a.m. and 4 p.m. on 600 metres

and at noon and 10 p.m., 952 metres; and at noon and 10 p.m., by Puget Sound, Marshfield and Point Arguello on 600 meters. Weather report from Farallones Islands is forwarded to San Francisco for Marine Exchange at 8 a.m., noon, and 5 p.m.

The daily bulletin broadcasted by San Francisco, North Head, and San Diego will consist of two parts as for Atlantic coasts.

The points on the Pacific coast from which weather conditions will be furnished are—

T=Tatoosh.
NH=North Head.
E=Eureka.
SF=San Francisco.
SD=San Diego.

The bulletin will begin with the letters U S W B S F, signifying United States Weather Bureau, San Francisco, and the weather conditions will follow in the same code as for Atlantic coasts.

If the weather conditions for any station cannot be supplied, the initial of the station will be given, followed by the word "Missing"; and if any portion of a report cannot be furnished, such portion will be replaced by an equivalent number of letters, X.

The coast line of the western part of the United States will be divided as follows:—

Northern Pacific, Tatoosh to Cape Blanco.
Central Pacific, Cape Blanco to Point Arguello.
Southern Pacific, Point Arguello to San Diego.

The forecast and warning will be in ordinary language, and will cover a period of 24 hours from 5 p.m., date of issue. At the end of the forecast a statement will be made in regard to the location and movement of any barometric depression that may be likely to affect the winds over the ocean.

Example of forecast and warnings:

Northern Pacific missing Central Pacific Wednesday rain heavy southeast winds Southern Pacific moderate southerly winds period Southeast storm warnings displayed Pointarguello to Capeblanco.

PANAMA (CANAL ZONE).

Hydrographic information and weather reports, when received, are broadcasted immediately after 5 a.m. and 1 p.m. time at Balboa (NBA) on 7,000 metres (arc) and by Colon (NAX) on 1,500 metres (spark). At 5 a.m. Balboa (NBA) also broadcasts this information on 2,400 metres spark.

In addition to above, hydrographic information and weather warnings are broadcasted for ships in the Atlantic by Colon (NAX) and, for ships in the Pacific, Cape Mala (NNT), on 600 metres, immediately after receipt and at 8 a.m., noon, 4 p.m., and 8 p.m. (75th meridian time).

RADIO COMPASS STATIONS.

Radio compass stations have been installed on the Atlantic coast for the purpose of supplying vessels with bearings and positions. These stations are divided into two classes—those operating independently, and others, called harbour-entrance stations, operated under the control of a central control station at harbour entrances in order to guide vessels to the entrance buoys. The independent stations have been located with a view to giving good cross bearings to ships which are not over 150 miles distant from the coast, while the harbour-entrance stations have been located with a view to furnishing vessels with positions when they are within 50 miles of the entrance to the outer channel.

Harbour-entrance radio compass stations differ from those acting independently in that they are connected to and controlled by a central control station.

International Time and Weather Signals

INSTRUCTIONS CONCERNING RADIO COMPASS STATIONS

1. There follows a list of harbour-entrance radio compass stations.

Harbour entrance.	Compass-control station.
Boston, Mass.	Boston
New York, N.Y.	New York
Delaware Capes	Cape May
Chesapeake Capes	Virginia Beach

The following radio compass stations take bearings for Boston.

Place.	Latitude.	Position.
Gloucester, Mass.	42 35 19 N	7
Deer Island, Mass.	42 21 15 N	7
Fourth Cliff, Mass.	42 09 40 N	7

The following radio compass stations take bearings for New York.

Place.	Latitude.	Position.
Fire Island, N.Y.	40 38 07 N	73
Rockaway Beach, Long Island	40 33 52 N	73
Sandy Hook, N.J.	40 28 12 N	73
Mantoloking, N.J.	40 01 30 N	74
Montauk, Long Island	41 03 09 N	71

The following radio compass stations take bearings for Cape May.

Place.	Latitude.	Position.
Cape May, N.J.	38 56 41 N	74
Cape Henlopen, Del.	38 47 26 N	75
Bethany Beach, Del.	38 32 45 N	75

The following radio compass stations take bearings for Virginia.

Place.	Latitude.	Position.
Hog Island, Va.	37 22 36 N	75
Smith Island, Va.	37 07 08 N	75
Cape Henry, Va.	36 55 16 N	75

- To obtain a bearing from independent radio compass stations bearings by means of a conventional signal given below. call include the other compass stations can be obtained by the same procedure with the exception that the compass stations should be called instead of the compass station.
- When bearings are requested simultaneously from two or more stations the compass station which is farthest north will supply the bearing.

INSTRUCTIONS CONCERNING RADIO COMPASS STATIONS.

There follows a list of harbour-entrance radio compass stations :

Harbour entrance.	Compass-control station.	Radio call.
Mass.	Boston	NAD
N.Y.	New York	NAH
Capes	Cape May	NSD
the Capes	Virginia Beach	NCZ

The following radio compass stations take bearings for Boston :

Place.	Position.	
	Latitude.	Longitude.
	° ' "	° ' "
r, Mass.	42 35 19 N	70 41 08 W
nd, Mass.	42 21 15 N	70 57 30 W
iff, Mass.	42 09 40 N	70 42 22 W

The following radio compass stations take bearings for New York :

Place.	Position.	
	Latitude.	Longitude.
	° ' "	° ' "
d, N.Y.	40 38 07 N	73 12 32 W
y Beach, Long Island	40 33 52 N	73 52 40 W
ok, N.J.	40 28 12 N	74 01 06 W
ing, N.J.	40 01 30 N	74 03 10 W
Long Island	41 03 09 N	71 57 27 W

The following radio compass stations take bearings for Cape May :

Place.	Position.	
	Latitude.	Longitude.
	° ' "	° ' "
, N.J.	38 56 41 N	74 53 10 W
lopen, Del.	38 47 26 N	75 05 16 W
each, Del.	38 32 45 N	75 03 20 W

The following radio compass stations take bearings for Virginia Beach :

Place.	Position.	
	Latitude.	Longitude.
	° ' "	° ' "
d, Va.	37 22 36 N	75 42 37 W
nd, Va.	37 07 08 N	75 53 42 W
ry, Va.	36 55 16 N	75 59 51 W

To obtain a bearing from independent radio compass stations, call the from which the bearing is desired in the usual manner and request s by means of a conventional signal given below. Simultaneous s from two or more compass stations can be obtained by making the ude the other compass stations desired.

To obtain bearings from harbour-entrance compass stations carry out e procedure with the exception that the compass-control station e called instead of the compass station.

When bearings are requested simultaneously from two or more compass the compass station which is farthest north will supply the ship with

NN

its bearing first; the others will then follow in the order of their north to south, or east to west, geographical location.

5. The following abbreviated signals will be used until further notice :

Signal.	Meaning.
QTE ?	What is my true bearing ?
QTE	Your true bearing is ——— degrees from ——— radio compass station.
QTF ?	What is my position ?
QTF	Your position is latitude ———, longitude ———.

6. The radio compass station (or compass-control station for harbour-entrance compass stations) will answer requests for bearings and positions in the customary manner of answering calls and follow their call letters with " K " if they desire to take a bearing at that time, " QRX " if they desire the vessel to stand by, or other abbreviated signal authorised by International Regulations.

7. On being told to " K " vessels desiring bearings or positions will transmit their radio call letters for 30 seconds and then make dashes 5 seconds long for 1 minute, making their call letters 3 times after each 5-second dash and terminating with the conventional signal " K " (go ahead).

8. At the expiration of the direction-determining signals the radio compass station (or compass-control station) will call the vessel, make " QTE," and send the bearing in degrees (0 to 359) and the name of the compass station which obtained the bearing, or " QTF " and the position in latitude and longitude. Bearings and positions will always be transmitted to the vessel in words to avoid error.

9. Vessels acknowledge receipt of bearings and positions by making the call letters of the station transmitting the bearing or position once, " DE," vessel's radio call letters, and then repeats the bearing or position received, using numerals.

10. Independent radio compass stations keep watch on 800 metres spark, and this wavelength should always be used to call these stations.

11. Merchant vessels will call all radio compass and compass-control stations on 800 metres and carry out all tests and communication with them thereafter on this wavelength.*

12. Commanders of vessels should note that shore radio compass stations cannot distinguish between the bearing of a ship and its reciprocal unless the reciprocal bears inland. There is, therefore, a possibility of an error of 180 degrees. In such cases the decision is left to the commander of the ship as to which is the correct bearing.

13. Subject to the foregoing, bearings should be accurate within 2 degrees of arc. When bearings from three or more compass stations are not over 2 degrees of an arc in error, but do not meet at affixed point, the centre of an area enclosed by the bearings can generally be taken as the approximate position of the vessel.

14. The following U.S. naval shore radio compass stations are now in operation for the purpose of furnishing bearings to vessels in the West Atlantic :

Radio Compass Station.	Radio Call.	Position.
Gloucester, Mass.	.. NAD	Lat. 42° 35' 19" N Long. 70° 41' 08" W
Deer Island, Mass.	.. NAD	Lat. 42° 21' 15" N Long. 70° 57' 30" W
Fourth Cliff, Mass.	.. NAD	Lat. 42° 09' 40" N Long. 70° 42' 22" W
Cape Cod, Mass. . .	.. NAE	Lat. 42° 02' 58" N Long. 70° 04' 32" W
Surfside, Nantucket, Mass.	NBS	Lat. 41° 14' 42" N Long. 70° 05' 56" W
Price's Neck, R.I.	.. NAF	Lat. 41° 27' 06" N Long. 71° 20' 15" W
Watch Hill, R.I.	.. NAF	Lat. 41° 18' 21" N Long. 71° 51' 29" W

* On and after April 1st, 1920, the 800-metre wavelength and no other will be used by all United States Naval shore radio compass stations.

Radio Compass Station.	Radio Call.	Position.
Montauk, L.I.	NAH	Lat. 41° 03' 09" N Long. 71° 57' 27" W
Fire Island, N.Y.	NAH	Lat. 40° 38' 07" N Long. 73° 12' 32" W
Rockaway Beach, N.Y.	NAH	Lat. 40° 33' 52" N Long. 73° 52' 40" W
Sandy Hook, N.J.	NAH	Lat. 40° 28' 12" N Long. 74° 01' 06" W
Mantoloking, N.J.	NAH	Lat. 40° 01' 30" N Long. 74° 03' 10" W
Cape May, N.J.	NSD	Lat. 38° 56' 41" N Long. 74° 53' 10" W
Cape Henlopen, Del.	NSD	Lat. 38° 47' 26" N Long. 75° 05' 16" W
Bethany Beach, Del.	NSD	Lat. 38° 32' 45" N Long. 75° 03' 20" W
Hog Island, Va.	NCZ	Lat. 37° 22' 36" N Long. 75° 42' 37" W
Smith Island, Va.	NCZ	Lat. 37° 07' 08" N Long. 75° 53' 42" W
Cape Henry, Va.	NCZ	Lat. 36° 55' 16" N Long. 75° 59' 51" W
Cape Hatteras, N.C.	NDW	Lat. 35° 14' 22" N Long. 75° 31' 42" W
Cape Lookout, N.C.	NAN	Lat. 34° 36' 13" N Long. 76° 32' 15" W
Morris Island, S.C.	NAO	Lat. 32° 41' 33" N Long. 79° 53' 15" W

NOTE.—The following radio compass stations are temporarily out of commission: Fourth Cliff, Mass.; Cape Cod, Mass.; Surfside, Nantucket, Mass.; Price's Neck, R.I.; Watch Hill, R.I.; and Rockaway Beach, N.Y.

Where two or more of the foregoing compass stations have the same radio call it indicates that they are connected by wire telegraph to and under the control of a central control station, the radio call being the call of the central control station. When a request for bearings is made the central control station invariably answers with a bearing from each of the compass stations under its control.

URUGUAY

The Station of Cerrito radiates each day (excepting Sunday) between 10 p.m. and 11 p.m. (Greenwich mean time) a radiotelegram, issued by the International Meteorological Institute which contains the following information;

(a) The situation of centres of atmospheric movement in the southern part of the Continent in the zone between latitude 22° and the extreme south.

(b) Observations made at 12.20 p.m. (Greenwich mean time) by the Central Observatory at Monte Video and by stations of the National Service.

(c) The most important changes observed between 12.20 and 9 p.m. (Greenwich mean time).

NOTE.—For the wording of this radiotelegram the International Meteorological Telegraph Code will be used.

SPECIAL ARTICLES SECTION

(A) National Résumés:—

Canada

China

France

Germany

Italy

Japan

Netherlands

Norway

Spain

United Kingdom

United States

(B) General Articles:—

**Some Outstanding Problems of Radio
Reception—Interference**

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NATIONAL RÉSUMÉS

THE TECHNICAL PROGRESS OF RADIOTELEGRAPHY AND RADIOTELEPHONY IN CANADA DURING 1920

BY PROFESSOR A. S. EVE.

UNDER protection of the Canadian Patent granted to General G. O. Squier practical tests of guided waves (wired wireless) were made in May, 1919, between Toronto and Dundas, Ontario, by Dr. L. De Forrest, Dr. C. A. Culver and others.

On a busy circuit of the Ontario Hydro-Electric Telephone System two two-way wired wireless channels were superimposed without interference, the frequencies varying from 18,000 to 39,000, and even 500,000 were successful.

Similar trials did not interfere with a duplex printing telegraph system in operation between Toronto and Montreal. It appears probable that six two-way guided-wave telephone channels may be simultaneously operated over the usual circuit, in addition to the customary use of the line.

Under the Radiotelegraph Branch of the Canadian Naval Service there are—

Coast stations	...	...	...	44
Direction finding stations	...	...	...	3
Government ship stations	...	...	...	51
Licensed ship stations	...	...	...	145
Commercial stations	...	...	...	13
Experimental stations	...	...	...	9
Amateur stations	...	...	...	281

Some of the coast stations are operated by the Radiotelegraph branch of the Canadian Naval Service, and others, under contract, by the Marconi W/T Company of Canada.

The Government owned and operated station at Barrington, N.S., is fitted with $5\frac{1}{2}$ kw. and 10 kw. Marconi spark set and a 25 kw. Poulsen arc set. This station maintains a commercial service with Bermuda on 4,200 metres, C.W., and a long-distance commercial service with ships at sea.

The Marconi Station at Glace Bay maintains a well-operated transatlantic communication with Clifden, Ireland.

The Port Nelson Station is completed at Hudson Bay, and Mansell Island Station is half completed. Highly satisfactory results have been obtained with the three Government Direction Finding Stations at Cape Race, Newfoundland, at Canso, Nova Scotia, and at Chebucto Head, Nova Scotia. Two additional D.F. Stations will be erected this year, one on the Atlantic, the other on the Pacific coast.

The Marconi Company's transatlantic service has been improved by the installation of Franklin aerials at the Louisburg receiving station,

The six 300-foot steel masts have now been replaced by two of wood, only 180 feet in height, separated by a distance equal to a quarter of a wavelength (6,000 metres), and in a direct line with the transmitting station at Clifden. From each of these masts is suspended a pair of triangular loop aerials, in planes at right angles to one another, as employed at D.F. stations. With the new arrangement at Louisburg, interference from six directions, including that of the transmitter at Glace Bay, 12 miles distant, is successfully balanced out, as are also horizontal static disturbances from these directions, and vertical static disturbances.

Canada's rapidly expanding merchant fleet creates a demand for ship installations and has led to the development of new apparatus, notably a "panel" transmitter embodying several novel features. In this set provision is made for the transmission of minimum, medium, or maximum power on any one of three commercial wavelengths, the simple rotation of a switch and wheel automatically effecting the necessary changes in the respective circuits. About forty ships were equipped by the Marconi Company with various types of apparatus during the period under review.

Considerable attention has been devoted to wireless telephony. Demonstrations of the Marconi system in British Columbia have resulted in its adoption by the Provincial Government Forestry Department, for communication between Vancouver, Van Anda, Thurston Bay, and several river launches employed in forest patrol work. Reports to date indicate that wireless telephone, by providing a ready means of warning, is proving an invaluable aid in the protection of forests from fire, and there is every likelihood of its being widely used for this purpose in the near future. In Ottawa, during May, 1920, the writer delivered an illustrated lecture on "Some Inventions of the Great War" before a meeting of the Royal Society of Canada. The lecture dealt particularly with progress in wireless telegraphy and telephony, and, thanks to the co-operation of the Department of the Naval Service and the Marconi Wireless Telegraph Company of Canada, the audience was entertained with music and speeches transmitted by radiotelephone from the company's plant in Montreal, over one hundred miles away. The demonstration gave great satisfaction, in spite of the fact that the improvised receiving station was located in the centre of a highly electrified city and had no screening to eliminate the ether disturbance inherent to such conditions. During the following month, the scene of wireless telephone activity was moved to Winnipeg, where very satisfactory tests were made with Marconi apparatus between the city and Portage la Prairie. Again were demonstrated the wonderful possibilities of the wireless telephone as a connecting link between large Canadian centres and outlying towns which are either subject to isolation through the effect of storms, forest fires, and so forth, or are prevented from enjoying line-telephone connection through the prohibitive expense involved. The most important radiotelephone event of the year, however, was associated with the visit to Canada of the Imperial Press Delegation, when the s.s. *Victorian*, which carried the delegates, was kept in telephonic touch with shore throughout the voyage from England. Arrangements for communicating with the vessel from the Newfoundland side were entrusted to the Canadian Marconi Company, who conceived the

happy idea of erecting their apparatus on the scene of Mr. Marconi's first startling transatlantic experiment in 1901—Signal Hill, St. John's. The installation was of a temporary nature, and considerable difficulty was encountered in obtaining a satisfactory "earth" connection, but, notwithstanding these drawbacks, communication with the *Victorian* was established at a thousand miles, so that the Imperial Press delegates were able to speak from mid-Atlantic to the English or Canadian shore at will. Excellent speech was also heard at St. John's on this occasion from Chelmsford, England. Wireless telephone tests and demonstrations have been carried out since at various points, notably at Toronto National Exhibition, in September.

At the time of writing, public announcement is made of the union of the Canadian Marconi Company with the radio interests of the Canadian General Electric Company, one important result of this combination being that the Canadian Marconi Company will acquire the use of the valuable patents of the Canadian General Electric Company, including those covering the Alexanderson Alternator.

THE TECHNICAL PROGRESS OF RADIOTELEGRAPHY IN CHINA DURING THE YEAR 1920

BY F. E. ROBINSON.

The progress of Radiotelegraphy in China has been somewhat hampered owing to the unsettled state of the Government, but in spite of this a fair amount of progress has been made. Three Marconi 25 kw. arc stations are under construction, at the following places: Urga, the capital of Mongolia, Urumsti and Kashgar in Eastern Turkestan. The station at Urga will be completed at the end of October of the present year, it is expected that the remaining two stations will be completed at the end of 1921.

The Chinese National Wireless Telegraph Company, a joint concern of the Chinese Government and Marconi's Wireless Telegraph Company of London, has under construction a factory at Shanghai, which will be ready to undertake the construction of wireless telegraph apparatus by about April, 1921.

A National Research and Testing Laboratory is being instituted by the Chinese Government in Peking. The laboratory will be fitted up with all the latest instruments and apparatus required for research work in Radiotelegraphy. Four students have been sent to the Marconi works in England to study Wireless Telegraphy.

The Ministry of War has formed a Wireless Telephone Signal Corps which is officered entirely by Chinese military officers. This Signal Corps saw active service during the late trouble and proved its usefulness when the telephone and telegraph wires were cut.

There is no doubt that there is a big field for Radiotelegraphy in China, and it is expected that rapid strides will be made as soon as the country is under a stable government. Apart from Government enterprise, Chinese business men will instal Wireless Telephone sets in various cities in the provinces.

Probably during the coming year practical results will show up,

most of the work during 1920 being in the nature of spade work, as Radiotelegraphy has been rather neglected in China during the five years of the European War.

THE TECHNICAL PROGRESS OF WIRELESS TELEGRAPHY IN FRANCE DURING THE YEAR 1920

BY MARIUS LATOUR.

THE Wireless Station Lafayette, the most powerful in the world, a remarkable manifestation of the French-American friendship, was completed in 1920. It owes its origin to General Pershing's request that uninterrupted communication should be maintained between the expeditionary forces engaged in Europe and the United States. The importance of this demand was realised and resulted in the initiation, in 1917, of the Lafayette Station at Croix d'Hins, near Bordeaux.

The results obtained at the Lyons Station, which at the time of the discussion of the new project were rapidly helping to improve the newly established communication between France and the United States, gave French military Radiotelegraphy a basis from which to determine the main characteristics of the new installation. The anticipations foreshadowed at that date have been fully justified.

The United States could deliver towers 250 metres high and arc converters of 1,000 kilowatts as well as all the necessary accessories. The American Navy has accordingly taken charge of the installation of this material. To the French Military Service was entrusted the construction work, the erection of the buildings, the laying of the foundations of the towers and the carrying out of all the technical work relating to the antenna and grounding. A place was reserved in the buildings for a high-frequency 500 kilowatts machine of French construction, which could not be made available as quickly as the arc.

Official tests carried out by the American Navy between the 20th of August and the 20th of September have shown that the signals sent out from the Lafayette station could be received all over the world and with an intensity surpassing that of all other existing stations.

The horizontal antenna used at Croix d'Hins is supported on 8 towers 250 metres high of the well-known Arlington type. The towers are placed in two rows, separated by 400 metres of intervening ground, and are spaced 400 metres apart. The antenna capacity is 0.050 mf. ; its proper wavelength is around 8,400 metres. The normal working wavelength is in the neighbourhood of 23,500 metres.

The arc supplied by the Federal Co. is of the type described in the Proceedings of Radio-engineers. It permits a very accurate regulation of the magnetic field and is of robust construction.

The total resistance of the antenna is now near 1 ohm 5. Under ordinary conditions the antenna current reaches and even surpasses 500 amperes with a voltage slightly superior to the normal voltage of the exciting dynamo. The insulation of the antenna is

perfectly insured by means of porcelain insulators of American manufacture.

In the course of construction very interesting measurements were carried out. They will undoubtedly throw considerable light on the question of antenna losses.

The Lafayette Station is not yet completed. The French are continuing the work: a 500 kilowatts alternator of the Société Française Radioélectrique will be installed, and is expected to be in operation in 1921. The antenna current will be increased.

Referring to the reception of radio signals in 1920, the investigations were directed, on the one hand, towards improvements of communication between different stations by means of amplifiers of high resonance based either on the regeneration principle or on the use of a number of selective stages on the high and low frequency sides.

On the other hand, different systems for the elimination of static disturbances were tried out, with the result that *uninterrupted* communication between America and France could be made possible. An antenna input of 200 kw. in the American stations would be sufficient at a speed of 40 words per minute.

The photographic method of registering the signals at greater speed was developed to a point where the reception of several hundred words per minute was rendered practical. The energy consumed by the registration of 200 words per minute is of the order of ten microwatts.

TECHNICAL PROGRESS OF RADIOTÉLEGRAPHY IN GERMANY IN 1920

BY DR. ENG. A. MEISSNER

IN the first months of 1920 wireless telegraphy was influenced by the restrictions of the Peace Treaty, and only after April, 1920, could regular long distance radiotelegraphy be taken up, especially with America. Through new agreements, communication with the great station of Marion, belonging to the Marconi Company in America (now the Radio Corporation of America) was secured. At the same time a new plant is being built on Long Island by the Radio Communication Company, to work according to the Telefunken principle of frequency doubling and to be used for wireless exchange with Germany. The great station at Eilvese, with a Goldschmidt Generator, is now solely in German hands.

It is of importance that the building of the new Telefunken station at Nauen is now finished. Nauen now possesses two antennæ, a spark transmitter of 100 kilowatts and three radio frequency alternators, two of which can be connected in parallel, each furnishing an antenna energy of 400 kilowatts, the third giving 130 kilowatts. One antenna can radiate two waves simultaneously.

It is generally assumed that shortly only high-speed telegraphy will be used by the high power stations; for that reason it has been found of great value to determine the best method of signalling and of regulating the frequency of the machine.

The solution of the signalling problem was already given by the solution of the principle of the high-frequency doublers. After the Telefunken Co. had, in 1911, solved the problem of generating hundreds or thousands of kilowatts of radio frequency energy by the action of a few kilowatts of direct current, there was no longer any difficulty in controlling the radio frequency by this direct current. With scarcely 10 amperes direct current, it is now possible to interrupt an antenna energy of 400 or more kilowatts in rhythm with the signals by a small relay. For this purpose two magnetised iron cores are used—constructed and inserted just like the normal doublers—connected in the primary circuit of the radio frequency machine (German Patent No. 303,094). By varying the direct current through the magnetising windings their self-inductance is altered and, therefore, the circuit is thrown more or less out of tune. Such an arrangement is also used for radiotelephony. In this way an antenna energy of 400 kilowatts can be controlled by the human voice. For this purpose an energy of not more than two kilowatts is necessary. This is obtained by several preliminary vacuum tubes and finally by two audio-frequency amplifying tubes each of $1\frac{1}{2}$ kilowatts capacity, connected in parallel.

In order to regulate the frequency of the high frequency generator over wide limits, that is, to obtain a continuous range of wavelengths, a special machine set is added. In this arrangement the motor of the radio-frequency alternator is mounted on the same shaft as an auxiliary direct current motor, the brushes of which are connected to the direct current side of a rotary converter; the converter is connected to the three-phase line voltage. Without entering into the theory, it need only be mentioned that it is possible (by changing the field excitation of the auxiliary motor) to regulate the frequency of the driving motor from synchronism to zero, whilst the turning moment remains almost constant. The size of the auxiliary motor and converters corresponds to the desired change of frequency. If, for instance, a change of frequency of 30 per cent. is desired, the power of the auxiliary motor and converter must amount to about 30 per cent. of the power of the main driving motor. The regulation of the frequency is performed just as accurately and in the same way as in the case of a small direct current motor.

Besides this, another method of regulating the frequency has been employed to keep the frequency constant, in case the line voltage changes by a small amount if the load is changed over wide limits. The speed of the driving motor of the radio-frequency alternator may be changed by a variation of its field. Of course, the field of the motor may only be weakened to any great extent if the power output is simultaneously decreased, because otherwise the motor falls out of step. For radio-frequency transmitters the conditions are favourable for this method. If the circuit is closed, the frequency must be kept constant whilst the output is changed greatly, for in signalling the load on the machine varies between zero to full load. In practice a small decrease of the field strength is sufficient to obtain a constant frequency, even if the load is greatly decreased. To effect this regulation of the field by regulating the voltage, inductances are inserted into the supply leads of the three-phase motor. The windings of these coils are each divided into two parts, each of which is star connected. In this way the coils each have two neutral points. These points are

connected with a source of direct current, and, by changing the direct current magnetisation, the desired change of voltage of the motor is secured (German Patent, No. 276,283). By altering the direct current, the frequency is accurately regulated, and in addition the changes of the turning moment are compensated if the load on the machine rises from zero to full load in signalling.

New points of view have been developed for earthing high-power stations, the accuracy of which has been proved by experiments with models.

The reception at large stations is greatly improved by using directive reception and double heterodyne. Directive reception means reception from one single direction. If a frame antenna, which receives from two directions, is combined with an elevated antenna, a one-sided reception is obtained. This arrangement has proved up till now the best way of diminishing atmospheric disturbances—it is possible to reduce the disturbances in the ratio 1:4—and disturbances by high-power stations in the proximity of the receiver. Besides this, the receiving waves may be chosen nearly the same as that of the sender. The waves of the transmitter and receiver may even be identical, if the local arrangement is appropriate. If double heterodyning (German Patent, No. 300,896) is employed, an inaudible beat frequency of 6,000 to 10,000 cycles is first generated. After rectification of these beats, the currents of this frequency are strengthened by radio-frequency amplifiers, and then a second heterodyne is applied so that an audible frequency is produced. This double “superposition” is specially important for eliminating disturbing stations. For the same purpose tuned circuits are adjusted to give acoustic resonance. For receiving, a Morse printer is often employed. Through several improvements of reception it has now become possible to keep up continuous wireless communication with America throughout the twenty-four hours. Recording is possible for half the time.

For European communication all the spark sets were replaced by tube oscillators, and the first larger types (10 kilowatt in the antenna) were set going. Several tubes are connected in parallel, and the largest furnishes about 2 kilowatt antenna energy. In a short time still larger types will be constructed. Difficulties arose at first in operating large tubes in parallel. Short disturbing waves occurred through the large capacities between the various parts of the tubes, especially those between grid and anode. Waves of less than 1 meter wavelength have been observed. After the reason of their existence had been discovered, simple means were soon found to avoid them. The large tube oscillators operate with independent grid excitation, and with or without intermediate circuit.

Königswusterhausen, near Berlin, is now the chief station in Germany for European communication (with Spain, Sweden, Norway and the Eastern countries). Königswusterhausen is at the same time the central station for radiotelegraphy within Germany. For this purpose a number of one kilowatt tube oscillators have been put up each having a separate smaller antenna. The following communication routes in Germany have been put into operation recently: Berlin—Frankfurt a/m; Berlin—Darmstadt; Berlin—Dortmund; Berlin—Düsseldorf; Berlin—Hanover; Berlin—Hamburg; Berlin—Königsberg; Berlin—Stettin and Berlin—Breslau.

Duplex communication is used. The single receivers are 20 km. apart and are often furnished with high speed apparatus. Königswusterhausen supplies the quickest news to the press; in six months' time radiotelephony will be used. For this purpose quite simple types of receivers (press receivers) were constructed, which are appropriate for receiving one single wave, similar to the receivers for time signals. The development of radiotelegraphy for navigation has only made very little progress; herein the further development is prevented by the Peace Treaty. In spite of this, several attempts have been made to introduce directive transmitters and receivers, and calling devices, all of which are dependent on the cathode relay principle (German Patent, No. 300,013).

Whilst the small F.T. station (10-20 Watt) have almost disappeared from use—there are scarcely any aeroplanes left in Germany—they are used in wire telegraphy and telephony, firstly for telephony along the high voltage lines of power distributing systems, secondly in telegraphy and telephony along the land lines of the post office. Several "wired-wireless" installations of 50 to 150 kms. in length are in use on high voltage transmission lines—for instance, one along the 135 km. 100,000 volts line from the power station at Golpa to Berlin. It has become more and more obvious, that the only possibility of sure communication between the high voltage power station and the sub-stations is by radio-frequency telephony, for the many attempts which have been made with special wires for ordinary telephony along the high voltage land line routes have given no satisfactory results. The latter method of communication suffers by the disturbances of the high voltage, especially by the noises of the 50 period generators, and besides, this kind of telephony is a continual danger for the attendant. Very simple solutions have been found for the coupling of the radio-frequency apparatus so that the attendant is in no way endangered. Either the energy of the transmitter is transferred to the high voltage from antennæ of 50 to 100 metres in length, which are adjusted parallel to these wires, or the transmitter is directly connected with the high voltage wires through small high voltage condensers (of 100 to 200 cms. capacity).

Multiplex wired wireless telephony along the post office wires has made essential progress during the last year. Besides the numerous laboratory transmitters, the first commercial transmitters and receivers are now being used, and an exchange with more than 100 transmitters and receivers is being built. On the Berlin—Hanover; Berlin—Frankfurt a/m and Berlin—Stralsund lines more than 120 conversations of 3 minutes each have often been transmitted on each radio-frequency connection in 8 hours daily. According to the post office account the speech transmission is good. The audibility was adjusted to be the same as in the ordinary method of communication. The radio-frequency conversations were not disturbed by noises on the lines, and whilst the normal telephony often was obliged to be stopped because of too loud noises, the radio-frequency connection was in full action.

The three-fold high speed telegraphic line Berlin—Frankfurt a/m (600 km.) has also answered very well. Although the laboratory apparatus is still used, more than 4,000 words a minute have often been telegraphed. This is a maximum efficiency which has up till now never before been reached; it means a daily transmission of 16,000

telegrams, consisting of 10 words of 6 letters each, in 8 hours working time supposing that only half of this time is used for telegraphing.

The numerous published articles in German journals—*Jahrbuch für drahtlosen Telegraphie*, *Elektrotechnische Zeitschrift*—in the course of last year prove what great progress radio-telegraphy and telephony have made in Germany. The researches on amplifying and oscillating tubes are specially valuable. The many complicated questions which are contained in the problem of the sending and amplifying tubes and which were already solved by experiments, are now also theoretically fully explained—together with the problem of the audion reaction receiver. The latter is the most difficult, as herein all the sending and amplifying problems are combined and cannot easily be discerned. Through a new theory of the characteristic curves for oscillating tubes all the fundamental quantities are given which are necessary for the technical development.

THE TECHNICAL PROGRESS OF WIRELESS TELEGRAPHY IN ITALY DURING 1920

By COMMANDER GINO MONTEFINALE.

Chief of the Italian Navy W/T Laboratory, Spezia.

THE Radiotelegraph Laboratories of the Royal Arsenal at Spezia, the foundations of which were laid in 1897, immediately after the classic experiments made by Senatore Marconi in the waters of this maritime fortified town, were principally extended during the course of the great war both in order to meet the greater exigencies of Naval, Aerial and Colonial Radiotelegraphy, and in order to render aid to industrial radiotelegraph production. Whilst the majority of spark sets necessary for the various services continued to be purchased from the Marconi Company, which extended and perfected the National Laboratories of Genoa, the Laboratory of Spezia was specialising in the construction of continuous wave transmitting and receiving stations and especially in Poulsen arcs, a type of apparatus which, at a period when the transmitting valves had not attained to their present state of perfection, was found to be particularly suitable for the improvement of the radiotelegraph services entrusted to the Royal Navy and for the creation of new ones.

As a consequence of this, during the years subsequent to the Armistice and particularly this year, the Italian Government was able to complete the programme of installations previously decided upon between the Ministries of the Navy, of Posts and Telegraphs, and of the Colonies, with a sufficiency of apparatus which enabled it to make valuable contributions to the radiotelegraph communications of the Entente and of some of the minor States.

Towards the end of the year 1919, the International situation in trans-Caucasia and Southern Russia demanded the immediate installation of a high-power station at Constantinople to serve as an intermediate in the radioelectric communications between these regions and the principal western capitals. Italy was able to comply rapidly and efficiently and within a few months sent to the Golden Horn a floating radiotelegraph station constituted by an old unit of the Navy

suitably equipped for the purpose. Two Poulsen arcs of 25/50 kilowatts are used as continuous wave generators and are fed by powerful batteries of accumulators and Diesel generating sets taken from old hulls of submarines. The great aerial, of the multiple cage type, has a capacity of 0.003 mfd. and is traversed by oscillatory currents of the order of 45 amperes. Excellent communications were effected at a maximum distance of 2,000 nautical miles.

The good results obtained by this station induced the Roumanian Government to purchase from Italy a similar one which was installed in the premises of the Marconi station at Bucarest. This station, syntonised for the two waves of 7,200 and 20,000 metres, with an antenna current of 60 amperes, has worked excellently with Rome, Berlin, Massaua and Mogadiscio.

In June, 1920, contemporaneously with that of Bucarest, two great arcs of 150 kw. constructed at the Spezia works, were brought into service at Massaua. The project of this installation dated from 1916, but its execution was delayed by the difficulties of war and overseas transports. Notwithstanding the excessively hot climate of Massaua, little suited to the working of high-power arcs, this locality was selected in preference to another and colder place on the Erythrian Plateau, as there had already existed since 1910 a great Marconi spark station of 110 kw., the first high-power station to be erected on the Black Continent. Advantage could thus be taken not only of the same horizontal directional aerial, but also of the same electrical generators of the disc set. These in fact feed directly with alternating current the Marconi, or rather Poulsen station, by the interposition of suitable converter groups of 150 kw. capable of yielding continuous currents of 100 amperes at a potential of 900 volts. The spark station is tuned for a wave of 4,000 metres and the arc station is regulated for a wave of 8,000 metres. The adoption of the duplex receiving station of Asmara, also furnished with a horizontal directional aerial, new frame aerial receiving system and several valve amplifiers, effected a noteworthy improvement to the Rome-Massaua-Mogadiscio service, which now works with perfect regularity also for private and commercial communications, in competition with the Eastern Company's cables, constituting a classic example of long-distance communications by radiotelegraphy which, in our opinion, ought to have attracted more than others the attention of the Royal Commission for the British Imperial Wireless Scheme.

In September, 1920, a Poulsen arc of 50 kw. constructed by the Royal Navy was installed at the Marconi station of Coltano in order to feed, in turn with the spark set, the horizontal directional aerial. In all the arcs mentioned, the hydro-carbon vapour is obtained by means of alcohol rather than with illuminating gas, it being injected into the electrode cases by means of a special device designed by the Royal Navy. The use of illuminating gas is henceforth restricted solely to the station of S. Paolo, Rome.

The most important work which is now being carried out in the radiotelegraph laboratories of Spezia is, without doubt, that of the two arc sets of 350 kw. destined for the new Coltano Radio which will feed a large new aerial supported by metal towers 250 metres in height and insulated at the base.

One of the most striking aspects of the progress in Italian radio-

telegraphy in 1920 is the decisive trend towards the adoption of the vacuum lamps, also for transmission. This is a direct consequence of the radiotelegraph and radiotelephonic experiments conducted in April, 1920, between Rome and Chelmsford, and of the demonstrations made by Senatore Marconi during the cruise of the yacht *Elettra*, in Italian waters.

A first Marconi Valve Station was erected on the new palace of the Ministry of the Interior, and renders one of the most valuable services, connecting the capital with all the prefectures of the kingdom. A second set was installed at the station of Centocelle exclusively for communications with the Naval Authorities and with the Islands. Other valve stations are in course of installation in Sicily and on some of the surrounding islands, thus providing the principal localities with the telegraph communication of which they were hitherto deprived, owing to the lack of submarine cables or the difficulty of their maintenance. In connection herewith studies are in progress to obtain the same end in some colonial zones for which powerful spark stations had been projected, but of which the difficulties of transport and the high cost of working had not admitted of their installation. An interesting experiment has now been made at a place in East Africa situate in an impervious and mountainous zone where a valve station of small power should render the same service for which a high-power spark station was projected.

In August, 1920, a 6 kw. Marconi Valve Station was brought into operation at Coltano for communications with Spain and England.

The considerable progress of radiotelegraphy in Italy is due, in addition to the extremely patriotic work of Senatore Marconi, who placed at the disposal of the Royal Government all the patents of his company, permitting their reproduction, also to the notable contribution of the larger scientific institutions. First amongst these is the Istituto Elettrotecnico e Radiotelegrafico of the Royal Navy, Leghorn, to the honour of which is not only the first complete technical treatment, but also the first practical elaboration of vacuum tubes in Italy, and notable comparative studies on molecular pumps and pumps with mercury condensation, using liquid air as a valuable subsidiary.

Then follow the Istituto R.T. Militare and the Istituto Superiore Posteografico of Rome, whilst the university institutions are gradually interesting themselves in radiotelegraph questions, chief of these being that of Naples, together with Milan and Turin.

TECHNICAL PROGRESS OF RADIOTELEGRAPHY AND RADIOTELEPHONY IN JAPAN DURING THE YEAR 1920

By EITARO YOKOYAMA,

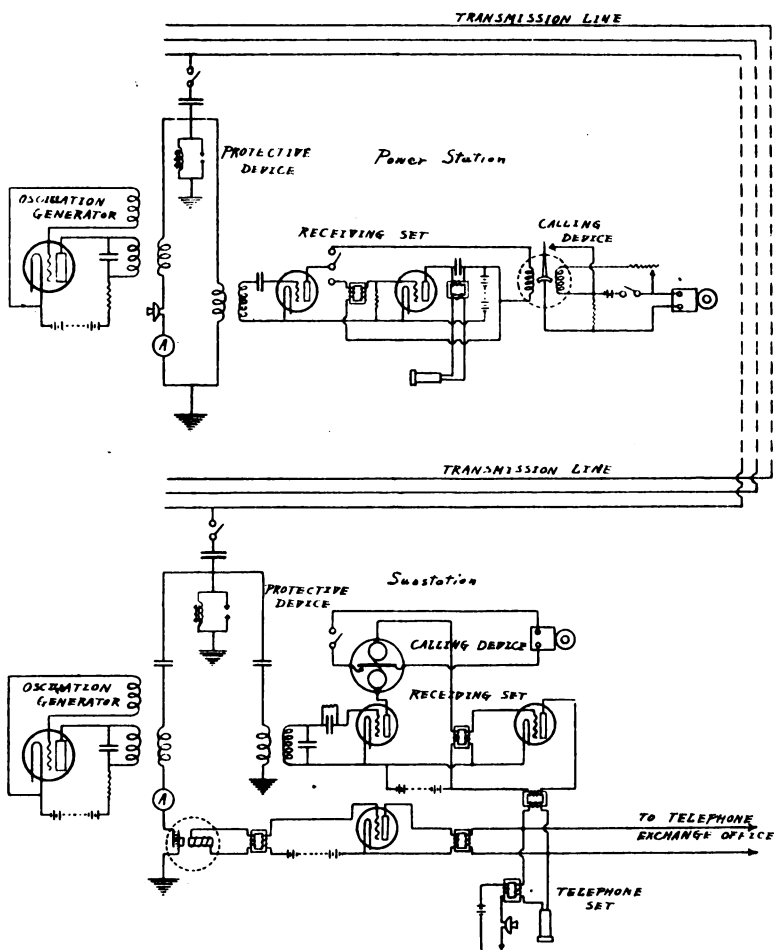
Superintendent of Radio Section, Electro-Technical Laboratory, Japan.

THE commercial radio frequency engineering researches in Japan during the year 1920 made little deviation from the ordinary routine of radiotelegraphy and radiotelephony which have been the main applications to radio frequency engineering. The latter relates essentially to the following three items:—

- (1) Wired Radiotelegraph over Battery Telephone Line.
- (2) Wired Radiotelephone over Power Transmission Line.
- (3) Connection of Wired and Wireless Telephones.

Concerning all these items, descriptions were made in the 1920 Year-Book by Dr. Wichi Torikata, and this *résumé* forms only a continuation, subsequent developments being briefly described.

A quite satisfactory experiment with wired radiotelegraphy over battery telephone line using three-electrode vacuum bulbs as oscillation



generator as well as receiver was first carried out at the end of 1917, and the system has been adopted between Tokyo and Osaka, 350 miles apart, since March, 1919. Constant attention has been paid to the improvement of the apparatus, especially the calling device, in even

its minutest points. Consequently, the result of the test will indicate whether a revolutionary change may take place in the system of electrical communication throughout Japan in the near future.

As to the application of wired radiotelephony to power transmission lines the first experiment over those of the Kinugawa Hydro-Electric Company and the second over those of the Fuji Hydro-Electric Company were referred to in the last Year-Book.

Mr. Marumo's paper on this subject in the June (1920) issue of the Proceedings of the Institute of Radio Engineers is worthy of perusal. As seen in the figure, condensers which are to be directly connected with transmission lines are an essential feature, and they have safely to stand under extra high tension of the lines. Such condensers are so expensive in price that it may make the whole system unsuitable for adoption by the electric power companies. A new method has finally been developed to overcome the above-mentioned difficulty, in which the high-tension condensers are entirely dispensed with. The third experiment has been successfully carried out at the Kinugawa Hydro-Electric Company with the new scheme since June, 1920. When transmission lines are struck by lightning, the battery telephone attached to transmission lines generally becomes out of order, and it follows that the important arrangement between power station and substation in this case of emergency is entirely useless, meanwhile the wired radiotelephony would not fail even in such a case. The transmission lines of the company are often damaged by frequent thunder storms, especially in the summer months, owing to the fact that the surroundings of the power station of the company near Nikko, are always the seat of severe atmospheric disturbances. The new system of wired radiotelephony has been excellently proved to be an ideal means of communication in transmission lines, the test having been continued throughout the lightning season of 1920. It is expected that the system will soon be adopted in electric power transmission practice.

Regarding the connection of wired and wireless telephones, a decisive test was carried out for about six months from February, 1920, at Kobe Harbour, after several preliminary experiments since 1917. A radiotelephone set was fitted on board the *Amerikamaru*, which is a Japanese-Formosan liner of 6,000 tons and comes into port every fortnight, and an exchange set of wired and wireless telephones was installed in the building of the Kobe Central Telephone Exchange Office. Clear and easy conversations were effected between the ship and wired telephone subscribers at Kobe, Osaka, and more distant cities. Plans are now being made to put the system to commercial use.

A further experiment is at present being carried on to enable any wired telephone subscribers of two different cities to converse with each other with telephone lines on both sides with wireless between. This is very useful in Japan for interisland telephonic communications, the telephony with a long submarine cable being difficult at the present time. The exchange offices for the experiment have been placed at Awomori harbour, the northernmost city of Japanese main island, and Hakodate harbour, the southernmost city of Hokkaido island. The two cities are sixty miles apart by sea.

In conclusion, it may be added that all the advancement mentioned above is largely due to the recent remarkable progress of vacuum bulbs, especially of transmitter bulbs, in this country.

THE TECHNICAL PROGRESS OF RADIO-TELEGRAPHY IN THE NETHERLANDS.

BY BALTH VAN DER POL, JUN., D.SC.,

Conservator of the Physical Laboratory, Teyler's Institute, Haarlem.

IN the account of the progress of wireless telegraphy and telephony in Holland which appeared in the 1920 Edition of this Year-Book we mentioned the increasing interest paid by Dutch scientists and engineers to the vast field of experimental and theoretical research in wireless telegraphy and electromagnetic waves in general. It is this scientific research of which we shall give a short résumé in this note.

Of course the wireless communication between Holland and her East Indian Colonies is of the utmost importance, and the success of such long-distance communication, now as triode amplifiers are in general use, is to a large extent depending upon the elimination of atmospherics. The use of a special earth-antenna developed by Mr. A. E. Vlug, of the Dutch Post and Telegraph Department, proved to be a success in this respect, as the ratio of the signal intensity to the intensity of strays is under circumstances more favourable with antennæ buried in the earth than with aerial systems. The reception of the signals from the Dutch East Indian Malabar Station appeared to be possible with these earth antennæ. Notwithstanding the great amount of experimental work done in this respect in various countries, a complete theory, which must take into account the conductivity and dielectric constant of the earth at the receiving spot, is still lacking though the important work of Zenneck and Von Hoerschelmann undoubtedly mark the first step in this respect.

Now that so many high-power stations are in use the difficulty is felt of preventing undesired signals to affect the receiving telephones. An improvement in this respect is obtained by using receiving systems having a small damping. But even then considerable trouble is experienced.

If, however, the apparent resistance for a given audible frequency is reduced as well, a considerable improvement in selectivity may be obtained. This idea is embodied in Dr. N. Kooman's Note-Magnifier. Between the ordinary telephone terminals of the receiving set and the phones a triode system is included having an audible frequency corresponding to the heterodyne note on which it is desired to receive the undamped signals. If by the well-known retroaction principle the apparent resistance for this particular beat note is reduced to nearly zero, the system is brought on the verge of oscillation with this audible frequency. Hence, of all audible oscillations, this particular one is magnified to a considerable extent resulting in a greater selectivity. Unfortunately, however, a practical limit to this mode of working is put by the finite time necessary for the oscillations to reach their definite amplitude, a time, which, as an elementary theory already shows, is the longer, the less the system is damped. And as this time is of the order of magnitude of the duration of the points and dashes of signalling, the reduction of the apparent resistance can only be carried to a certain degree. Nevertheless, the Kooman's tone magnifier proved to be a noteworthy improvement for obtaining selectivity.

Leaving for a moment the triode and its important applications, we find in a doctor thesis (1918) of Dr. M. J. Huizinga, entitled "De unipolaire geleiding van Kristaldetectoren," an interesting experimental contribution to our knowledge concerning crystal-detector. In particular, if a current is sent for some time through a molybdenite-metal detector, a small amount of a blue liquid is seen to appear at the contact spot containing various oxydes of molybdenum. During the passage of a circuit from molybdenite to the metal point very small gas-bubbles appeared in the liquid, thus indicating that some electrolytic action was taking place. As the deviations from Ohm's law are similar in the case where the blue liquid is visible under a microscope as in the case where it is not, and for other reasons, it is concluded that the detector action of such a crystal contact can be considered to be of electrolytic nature. Many characteristics of several other crystal detectors are plotted as well, which show a marked constancy, this being obtained by taking the series of measurements within as short a time as possible.

Turning again to the triode, we mention a valuable paper by Dr. D. Coster (Proc. Kon. Akadem. Amsterdam, Vol. XXI, No. 10, page 1), "On the use of the Audion in Wireless Telegraphy." A great many triode circuits are here described which enable self-sustained oscillations to be set up. A general theoretical treatment is given of the conditions which must be satisfied by the various electrical parameters of the circuit for oscillations to be generated. In order to simplify the analysis, as usual, only rectilinear triode characteristics are considered, but the treatment is of such a general nature that probably any known or even not yet "invented" circuit may come under these general cases.

In April, 1920, a doctor's thesis was presented by the present writer to the Utrecht University, entitled: "De invloed van een geïoniseerd gas op het voortschryden van electromagnetische golven en toepassingen daarvan op het gebied der draadloze telegrafie en by metingen aan glimlicht ontladingen." (Haarlem, 1920.)

In this thesis the great discrepancies between the theoretical magnitude of the wave amplitude at a big distance from a transmitting station with the one obtained experimentally are pointed out. Experiments are described where electromagnetic waves are caused to travel through tubes filled with rarified gases which are ionised by an independent glow discharge, thus imitating the state of the upper atmosphere. The experiments point to a decrease in apparent specific inductive capacity for the frequencies and ionic mobilities used, which is necessary to reconcile experimental and theoretical results with regard to the propagation of waves around the earth.

The increasing importance of the science of Wireless Telegraphy led to the establishment of a Dutch Scientific Radio Institute ("Nederlandsch Radio Genootschap"), May, 1920 (Address: Secretary: Utrecht, Willem Barentzstraat 8). This institute, which intends to be for Holland the centre of radio science, counts amongst its members most of the Dutch eminent physicists and radio engineers. The papers to be read at its meetings as well as other contributions will be published in the Proceedings of this Institute.

TECHNICAL PROGRESS OF RADIOTELEGRAPHY AND TELEPHONY IN NORWAY DURING 1920

BY COMMANDER B. L. GOTTWALDT, R.N.

THE year 1920 has not been specially remarkable as regards the development of new wireless stations coming under Government control. It seems as if the financial position in this country as in many other countries does not allow for the erection of larger wireless coast and land stations, although the authorities in charge of the Wireless Administration are doing their best by closely following the rapid progress of radiotechnics. The Telegraph Administration have, however, elaborated plans for linking up the whole country with land stations, as well as with coast stations, and special attention is paid to wireless communication between the northern part of the country and the capital.

Some interest has now been aroused in the wireless telephone problem, as the Telegraph Administration has erected two wireless telephone stations on the western coast of the country for wireless communication between the town Kristiansund and an island lying about ten miles to the westward of this place. As far as is known, these stations are working to the satisfaction of those concerned.

The Royal Navy have also taken a keen interest in the development of the modern wireless gear constructed for working on continuous waves with the well-known three-electrode valve transmitter. Several combined wireless telephone and telegraph stations have already been erected for the Military Service, and more stations are very likely to follow.

During the last year the Norwegian Parliament (*Storting*), have not issued any new wireless laws or regulations, most probably because they are awaiting the results of the new International Convention, which is to be held in Washington. The Telegraph Administration have not yet taken over any ship wireless stations in order to operate them on their own account, but this will now most certainly be done in the near future.

The restrictions imposed on wireless amateurs have not yet been relaxed, so there have been no activities in this respect either on the part of individual amateurs or of any wireless clubs, and this fact is certainly to be regretted.

The development of wireless telegraphy in the Mercantile Marine has progressed very rapidly owing to the new British Merchant Shipping Act for wireless telegraphy, which comes into force on the 1st of December, 1920, and also applies to foreign vessels.

At the beginning of 1920 there were about 150 ship stations installed on board Norwegian merchant vessels, and this figure will most probably be augmented to about 400 by the end of the year. All in all more than 450 vessels will have to be equipped with wireless installations in the near future, in order to conform to the new British regulations, and it seems as if at least about two-thirds of all the installations on board Norwegian vessels will be of the Marconi system, which thus still holds its predominant position in this country.

Wireless direction-finder stations have now been installed in

connection with the principal coast stations opened for International public correspondence. These D.F. stations are working on the usual normal wavelength of 600 metres, and are of the well-known Marconi-Bellini Tosi system with double loop aerials. Such stations are erected at Tjomoy, Flekkeroy, Utsire, Bergen and Ingoy Radio.

The Telegraph Administration have also plans for erecting smaller automatic radiophares at the most important ship-traffic entrances on the Eastern and Western coast, in order to enable vessels equipped with D.F. apparatus to take bearings themselves.

TECHNICAL PROGRESS OF RADIOTELEGRAPHY IN SPAIN DURING 1920

THE wide development of wireless communication in Spain gives clear evidence of the great attention which is paid in official and private centres in that country to this important branch of science.

The return of peace has allowed us to benefit from the improvements and recently developed devices which were kept secret during the war.

With reference to the Army, the small portable valve field stations, Type Z A 1, were tested with very successful results. These sets have already been in use by Spanish troops in Morocco, and have given full satisfaction.

The Army authorities are appreciating the advantages of valve stations, and have lost no time in obtaining several for the Telegraph Regiment and Wireless Field Battalion.

The Carabanchel station (Madrid), the largest permanent land station of the Spanish Army, has been improved by the addition of a Marconi 6 kw. telegraph and telephone valve set. The tests carried out with this set and a similar one recently fitted at Barcelona were remarkably successful. The speech from Carabanchel was also heard by the Army stations in Morocco.

During the important radiotelephone tests at Chelmsford, where Mme. Nellie Melba sang before the transmitting microphone, her voice was heard very clear at Carabanchel station.

The Navy Department is devoting the greatest attention to the direction finder. The erection of several direction-finding stations around the Spanish coast in order to assist navigation have already been decided for the very near future. Plans for the carrying out of this important service are being studied by the Naval authorities.

Arrangements have already been made for the fitting of a short-range wireless station in the Columbretes lighthouse for communication with a low-power station on the Spanish coast.

The Spanish Government has approved plans for the erection of two wireless telegraph and telephone stations, one in the Balearic Islands and the other in Valencia. These stations are intended to

supersede the existing cable. The contract for this scheme has been placed with the *Compañía Nacional de Telegrafía sin Hilos*, of Madrid.

Other schemes, among which may be mentioned the Aviation Service, are under consideration by the official authorities.

Special mention must be made of the *Compañía Nacional de Telegrafía sin Hilos*, the sole licensees for the carrying out of the wireless private service in Spain, which is performed by Marconi system stations at Aranjuez, Barcelona and other points of the coast.

Besides the ship service, that company is handling the Anglo-Spanish and German-Spanish traffic through the Aranjuez high-power station, while the Barcelona station is busy with traffic to Italy and Austria-Hungary.

The Aranjuez station was improved by the fitting of a 25 kw. arc transmitter, and the further installation of a valve transmitting set is contemplated for the near future.

The Barcelona station has also been provided with a 6 kw. valve equipment. Wireless telegraph and telephone tests have been recently effected with Carabanchel and Chelmsford using this set, with very satisfactory results. The conversation between Chelmsford and Barcelona was very easy and clear, which speaks highly in favour of the improvements brought about in valve work by the Marconi Company.

The Navy Department has already started to adopt valve instruments for the stations of the Spanish warships.

The Mercantile Marine is undergoing a period of remarkable activity and development, as is well evidenced by the large increase in the number of ships built in national and foreign shipyards for the Spanish register. As an obvious sequel, and, thanks to the adequate regulations issued by the Government, the field of maritime wireless has been considerably enlarged.

At the end of 1919, about 260 merchant ships carried wireless stations, and since the beginning of this year about 60 further ship stations have been already installed. There remains still a large number whose contracts for installation have been secured by the *Compañía Nacional*, and, with very few exceptions, all the stations of the Mercantile Marine are of the Marconi system.

The new ships of the *Compañía Trasatlántica* will be provided with the latest type of Marconi apparatus, including combined valve and spark transmitters, valve receiver, and direction finder.

As regards wireless amateurs, there are not many facilities for them. Nevertheless, the Government is encouraging true scientific students and investigators. The latest Royal Decree of 18th January, 1920, gives the regulations under which the wireless installations for scientific purposes are allowed to be erected. Provision is made to avoid interference with Government and public service stations.

The number of educational centres using wireless apparatus for teaching and testing purposes is increasing, and the demand for technical books on wireless shows the interest that has been aroused on the matter.

THE PROGRESS OF WIRELESS TELEGRAPHY AND TELEPHONY IN UNITED KINGDOM DURING 1920

BY E. V. APPLETON, M.A., M.Sc.

IN an attempt to gauge the progress of Radiotelegraphy and Telephony during the past year one is immediately confronted with the difficulty that many of the communications recently made by various workers have dealt with researches carried on in Service Departments during the war. Such work was of an intensive character, and, although two years have elapsed since the Armistice, the information gained in these researches has still not all been made public. If, however, the field under review is extended to include work either published or accomplished during the year a more definite pronouncement is possible, and one can unhesitatingly indicate as the two main features of recent advance the experimental work on Radiotelephony and the quantitative elucidation and design of triode valves with their associated circuits. But even though the progress made in these two directions during both the war and post-war periods has been distinctly phenomenal, the experience of the last year has shown decisively that much work is yet to be done before the short-distance communication maintained so successfully for war purposes can be copied over large distances for the commercial requirements of peace.

Considerable attention has been given to the increasing field of utility of Wireless Telegraphy and Telephony in aerial navigation. Wireless stations have recently been erected at Croydon, Lympne and Le Bourget (near Paris) for the purpose of maintaining communication with machines travelling along the London-Paris air route, and the magnificent achievement of maintaining a practically uninterrupted service of aeroplanes between Paris and London during the year is due in large part to the use made of Radiotelephony. On March 4th the first commercial machine (Handley-Page) fitted with a Wireless Telephony installation successfully accomplished the journey to Paris. The valve sets used were designed by the Marconi Company, and had as the main source of energy a high-tension generator driven by a small air screw working in the slip stream of the main propeller. Communication from land to machine and *vice versa* was maintained throughout the journey, the signals up to distances of 125 miles being quite clear and distinct. In order to render the co-operation of Radiotelephony and Aviation still closer and more effective it now only remains for a system of direction finding to be perfected in order to surmount what is practically the one outstanding problem of present-day flying—the successful landing of aircraft in foggy or hazy weather.

In long-distance land-to-land Telephony the Marconi Company achieved notable successes in the early part of the year. Satisfactory communication with Madrid was established in January with a 6-kilowatt continuous wave telegraph and telephone transmitter. In the following month a set of similar design, but two and a half times as powerful, was erected, and marks the inauguration of the first wireless telephone news service in the world, clear and distinct speech being received on ships over a thousand miles distant, using only the

ordinary type of ship's receiver. The source of power was a 200-cycle, 500-volt; 15-kilowatt alternator feeding the primary of a 20,000-volt transformer. Large valve rectifiers with accessory condensers maintained a fairly smooth source of direct voltage, for the transmitting valves of which six were used in parallel. With the circuit used the modulation is brought about by shunting the aerial tuning inductance by a varying resistance (the anode circuit of the so-called "absorption" valve), which resistance is caused to vary (by means of amplified grid control) in accordance with the speech frequency as interpreted electrically by the microphone.

During the year some important communications have been made on the subject of Duplex Wireless Telephony on Aircraft as investigated at the R.A.F. Wireless Experimental Establishment. The primitive system of having a change-over switch to make the change from sending to receiving circuits reduces the utility of the simple radiotelephonic set, and a scheme similar to that of ordinary Line Telephony is much to be desired. The solution of the problem practically resolves itself into that of protecting the receiver from the transmitted radiation of the same set. The various valve methods in use for this purpose at ground stations are not feasible for aircraft work and schemes of an entirely different nature have been tested. The quiescent aerial arrangement first proposed by the General Electric Company in America and independently by Professor Whiddington in England has been given a thorough trial. In this scheme the transmitting microphone circuit is inductively coupled to the anode circuit of the oscillating valve, so that oscillations are maintained in the transmitter only while speaking. The unsatisfactory nature of the signals obtained is supposed to be due to the lag between the anode voltage variation and the amplitude variation of the oscillatory current. A much more satisfactory scheme was found to be available in the use of different wavelengths for transmission and reception. A single aerial circuit was used with suitable accessory absorbing circuits, and it was found possible to work satisfactorily with a frequency difference as low as 10 per cent. of the actual frequencies used.

As has been stated above, considerable progress has also been made in the quantitative elucidation of triodes and their circuits. The progress made in this direction by the Wireless Departments of the Navy has been summarised in a communication by B. S. Gossling dealing with the design of receiving valves from various theoretical and experimental considerations. Such work was made possible by the mathematical theory of the cylindrical triode developed by Sir J. J. Thomson, and the experimental data on the emission of the short-tungsten filaments available from the researches of G. Stead. Methods of testing and comparing triodes in terms of satisfactory electrical quantities have been developed by W. F. Jordan, F. E. Smith, and the late H. C. Napier, and Professor W. H. Eccles, while the last-named in numerous papers and lectures has expounded a simple and adequate theory of triode action, and also drawn the attention of workers in other branches of pure and applied physics to the invaluable laboratory instrument originated and developed by workers in Radio-telegraphy.

Of special interest are the two automatic calling-up devices announced during the year. The first is due to the Marconi Company,

and has a range of about 80 miles. A series of dots of a frequency 3-per-second on the standard 600-metre ship's wave are transmitted using a relay signalling key controlled by an oscillating flywheel swinging at the desired rate. The receiver is a three-valve amplifier used in conjunction with an oscillating relay similar to the one used in the transmitter. The small balance wheel of the receiving relay is set in motion by the amplified received currents, the amplitude increasing until a contact is closed and the call-bell operated. The second type, due to B. Binyon, is designed to operate with Morse signal calls of three or four letters, and makes use of a Turner valve relay and a selector mechanism, due to Shepherd. The apparatus can be set to respond to the call of S.O.S. and the receiving ship's call.

The problem of high-speed transmission is a vital one in present-day commercial Radiotelegraphy, and in this connection some experiments in progress at the Army Signals Experimental Establishment are of interest. In communication between Woolwich and Weymouth it has been found practicable to handle wireless traffic up to a speed of 113 words per minute, using punched tape transmission and Wheatstone inkler reception. Much difficulty is not anticipated from the electrical side in the attempt to attain much higher speeds, but the difficulties of mechanical design are expected to prove more formidable. Obviously a signal strong enough to activate an inkler could also be employed to operate a printer receiver of the Creed or other well-known types, and so translate the wireless message direct to land lines. One disadvantage, however, of such high-speed working with valve generators is that the purity of the wave is partly destroyed and the selectivity diminished because of the increments and decrements at the beginnings and ends of each signal.

The old problems of the cause and elimination of atmospherics still occupy the attention of many workers. With regard to the origin of these undesirable signals some experiments in another field of scientific investigation have emphasised the magnitude of the electromagnetic effects of thunderstorms. The recent researches of C. T. R. Wilson on the sign and magnitude of lightning flashes have shown that a current of many thousands of amperes is involved in a lightning stroke. Such an antenna current may well be the origin of an electromagnetic disturbance which travels more than once round the earth giving rise to multiple effects in a receiving antenna. The effect of the upper atmosphere in the transmission of both artificial and atmospheric signals still presents a fascinating field of research and data with respect to the measurement of signal strength and the determination of the variations of electromagnetic bearing of a given distant transmitting station are being patiently collected and correlated. With the more refined methods now available for the determination of these two quantities much progress on these lines may be anticipated in the near future.

During the year the findings of the Imperial Wireless Telegraphy Committee, appointed in November, 1919, by the Secretary of State for the Colonies, "to prepare a complete scheme of Imperial Communication in the light of Modern Science" have been published. Judging from various Post Office records submitted, the Committee formed the opinion that no satisfactory commercial wireless service is in operation

working over a distance of 2,000 miles, and recommend that the links in the Imperial chain be not greater than this distance. With the exception of the Poulsen arcs at present being constructed for the Cairo-Oxford service the Committee recommend the use of thermionic valves generators, the constructional work to be carried out by the Engineering Department of the General Post Office.

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PROGRESS IN RADIO COMMUNICATION IN THE UNITED STATES, 1920

BY ALFRED N. GOLDSMITH, PH.D.,

Editor of the "Proceedings of The Institute of Radio Engineers."

FOR the convenience of the reader, the subject matter of the following résumé has been classified under a number of headings.

Radiotelegraphic and Telephonic Transmitters.

The only new high-power transmitting equipments installed in the United States during 1920 have been of the Alexanderson alternator type. A considerable number of the 200 kilowatt units have been built, and have been or are being installed at Marion, Massachusetts; New Brunswick, New Jersey; Tuckerton, New Jersey; Kahuku, Hawaii; and Bolinas, California. The first three stations named handle traffic between the United States and Norway and Germany, England, and France respectively. The last two stations handle the traffic of the circuit between Japan and the United States.

Each of the alternator equipments in the stations referred to consists of at least two of the 200 kilowatt units, together with their associated radio frequency transformers, magnetic amplifier control for telegraphy, high-speed telegraphy, and telephony, speed control and tuning gear, and a large multiple tuned antenna. It is of interest to

note that these complete 200 kilowatt alternator apparatus assemblies are being built at the works of the General Electric Company for the Radio Corporation of America at the rate of two per month.

Work has been begun of the great New York Radio Central of the Radio Corporation of America, situated near the centre of Long Island. A tract of ten square miles has been purchased, on which there will be erected twelve long antennas. Each of these will be supported by six four-hundred-foot towers, and will be a mile and a half long. Multiple tuning of the antennas will be used, together with combined direct and capacitive grounds. The arrangements of the station will be such that the antennas and alternators can be transferred and combined at will. Thus, two or three, or more, of the antennas may be connected together as one large antenna, and the resulting combination fed from two of the alternators running in parallel. Such an arrangement would give a greatly increased radiation, and would be suitable for either extra long distance communication, high speed telegraphic communication, or radio telephony.

Commercial radio telephony in conjunction with the wire network of the country has been opened up by the American Telephone and Telegraph Company and the Western Electric Company. A radio link between the Californian coast and the Catiline Islands, a distance of 30 miles, has been established. Short waves are used, and duplex service is furnished. This radiophone service is at the disposal of every telephone subscriber in the United States. It has proved very popular, and is now used by the Catiline Islanders and others in a thoroughly matter-of-fact way.

Radiotelephony between ship and shore has also been established between the Foxhurst station of the Western Electric Company and a coastwise steamer. During a recent test, a number of persons on board this steamer in the Atlantic Ocean talked with individuals on the Catiline Islands through an interesting circuit consisting of radiophone over a hundred miles of the Atlantic Ocean, wire telephony across three thousand miles of continent, and radiophone across thirty miles of the Pacific Ocean. This is the first time in history that the voice of man has been carried across a continent and stretches of two adjacent oceans.

Arc transmitters in the 5 kilowatt, 2 kilowatt, and 0.5 kilowatt sizes have been developed by the Wireless Improvement Company. Of these, the most interesting is the last named. This is a semi-portable automatically controlled arc which operates directly on the ship 110-volt direct current supply without any motor generator. The arc is regulated automatically by solenoid control, drawing 500 watts from the ship's mains. At 600 meters, 3 amperes are put into the average ship's antenna; at 300 meters a current of 2 amperes is obtained.

A number of radiophone outfits in various sizes have been produced by the De Forest Radio Telephone and Telegraph Company. Unusual ranges of transmission have been found possible under especially favourable conditions as regards static and interference. One of the types of radiophone developed is a portable 5 or 10 mile outfit operated on storage battery and without motor generator. The plate voltage is obtained from a buzzer interrupter and appropriate transformer. Such outfits can be built to weight under 60 pounds.

A special spark set capable of emitting waves of unusually low decrement has been constructed by the Wireless Improvement Company. It consists of the ordinary 500 cycle quenched spark exciting circuit, closely coupled to an intermediate low-resistance circuit containing inductance and capacity, and of low resistance. Loosely coupled to this intermediate circuit is the ordinary antenna circuit which withdraws energy slowly from the intermediate circuit, the rate depending, of course, on the coupling between the two. Practically a single sharply defined wave is emitted, with varying amplitude corresponding to a 500 cycle note but with much diminished energy decrement. Thus, on a wooden ship having an antenna of such characteristics that the lowest decrement obtainable by associating the quenched gap circuit directly with the antenna was 0.2, by adding the intermediate circuit and properly adjusting the coupling, the measured decrement of the emitted wave was 0.02.

A low power duplex radiophone set produced by the Western Electric Company is based on the use of an artificial antenna having the same electrical characteristics as the actual antenna. The receiving set is so connected that the effects of the transmitting currents in the actual and artificial antennas neutralise, whereas incoming signal currents from the actual antenna produce an effect in the receiver circuits. Careful shielding of the various parts of this set is shown in the published illustrations.

The radio telephone has been used during 1920 for the first time in reporting the International Yacht Races. Airplanes and blimps, flying over the course and equipped with radiophone and radiotelegraph apparatus, have sent direct news of the progress of the races to the Editorial offices of the *Evening Post* in New York. The installation, which included amplifiers and loud speakers capable of giving signals readable at distances of 500 to 1,000 feet from the receiver, was carried out by the Radio Corporation of America. A land station of the corporation was also remotely controlled from the Editorial offices during these tests, and two independent receivers were in operation. Thus, probably for the first time, quadruplex radio communication was carried on. It is interesting to note that these yacht races were reported by radio by Marconi himself just twenty years ago.

Receivers.

The development of the special forms of receivers suitable for long distance working has been rapid during the year. A number of installations of modern type have been made for handling the traffic from Europe and the Orient, namely: for Norway and Germany at Chatham, Massachusetts; for England and France at Belmar, and Lakewood, New Jersey; for Hawaii at Marshalls, California; and for Japan at Koko Head, Hawaii. In addition, a long distance experimental receiving station has been established, also by the Radio Corporation of America, at Eastport, Long Island. In all of these stations, circuits of the utmost selectivity have been used, together with new forms of continuous wave detecting systems, the details of which are not at this time available.

Each of these stations is arranged for high speed recording. Among the various systems in use or under development at these stations are the phonograph or acoustic recorder and the Hoxie or photo-

graphic (visual) recorder. This latter device is a tuned reed vibration galvanometer of special design, and has been found to be capable of recording messages up to several hundred words per minute.

The unicontrol receiver developed by the Wireless Improvement Company has been improved in detail for use in connection with regenerative or heterodyning circuits, and its wavelength range has been extended to from 200 to 5,000 metres. When equipped with motor drive, it enables picking up any land or ship station within its wavelength range more or less automatically.

Vacuum Tubes.

The development of high and low vacuum receiving tubes by the General Electric Company during the year has been rapid, and several new forms of tubes have become available.

In addition to the development of higher power oxide-coated filament tubes, the Western Electric Company has produced an unusually small form of detector tube. Its filament requires but 1 volt. and 0.18 ampere at a plate voltage of 10 volts. Yet the tube has practically as great detecting capabilities as the larger well-known forms.

A series of transmitting tubes operating at voltages of from 500 to 1,800 volts. and with inputs of from 10 to 1,000 watts have been produced by the De Forest Telephone and Telegraph Company.

As the results of measurements and theoretical investigations by Dr. J. Miller and Mr. J. Weinberger (independently) it was found that the input, or grid circuit, impedance or ordinary three-electrode tubes at radio frequencies was not infinite, as had generally been previously supposed, but finite and dependent on the character and constants of the plate or output circuit. This effect is apparently due to the capacity couplings within the tube, and seriously influences the possibilities of securing high amplification with small input energy.

Static Elimination.

Mr. R. A. Weagant of the Radio Corporation has further developed his three-loop system of static reduction, and this system has been effectively used both experimentally and commercially at Lakewood, New Jersey on the English circuit.

Commander A. Hoyt Taylor, of the Navy, has reported tests of ground wires (subterranean and submarine) for static reduction, and it is stated that he has not only obtained marked results in this direction but has also been able, because of the directional selectivity of such receiving systems, to secure effective duplex operation with the transmitting station in the immediate neighbourhood of the receiving station.

As an interesting sidelight on what may be expected *if static were to be practically entirely eliminated*, there may be mentioned the recent remarkable achievement of a certain amateur who succeeded in sending intelligible radiophone messages from New Jersey to Aberdeenshire, Scotland, with a 100-watt radiophone transmitter!

Duplex Communication.

In the transoceanic service, it is necessary to utilise the capacity of the transmitting stations to the utmost. This involves duplex communication. The problem of receiving a weak signal from Europe

through atmospheric disturbances, with a transmitting station of several hundred kilowatts power radiating at a wavelength only a few per cent. different from the distant signal is a difficult one, particularly when the transmitting station is 10 or 20 miles from the receiving station. This problem has been solved by the use of a number of duplex balancing arrangements which have been developed and installed at its receiving stations during 1920 by the Radio Corporation of America.

Still other duplex methods, particularly adaptable to radio telephony, have been developed and described by Mr. Alexanderson. These involve the use of two antennas, and a Wheatstone Bridge for radio frequencies with the transmitter and receiver, in effect, in conjugate branches.

As previously stated, the highly directional receiving characteristics of subterranean and submarine long wire antennas have enabled Commander A. Hoyt Taylor and Lieutenant A. Crossley to work out an effective duplex system, wherein the transmitting set is remotely controlled from the comparatively nearby receiving station.

Radio Navigational Aids.

The use of cables carrying an audio frequency current under navigable channels as an aid to navigation has found increasing vogue in the United States during 1920. Although the method is not strictly one involving radio communication, the receiving apparatus is in some respects similar to that of a loop receiver for radio work. The ship carries a loop mounted so that it can be tilted about vertical and horizontal axes, this being connected to a multi-step vacuum tube amplifier. The magnetic field of the alternating current in the submerged cable cuts the loop on the ship, inducing currents which after suitable amplification are listened to in the pilot house. It is not difficult to decide whether the ship is off her course by swinging the loop and also by noting whether the signals are becoming fainter.

Mr. Robert H. Marriott carried out a number of experiments along these lines in Puget Sound. Successful results were obtained. A destroyer was also piloted straight through New York harbour to her berth by a navigating officer who did not employ any of the usual aids to navigation, relying altogether on the inductive signalling method above mentioned. The marking of a tortuous channel by these methods will be increasingly common practice. In one interesting modification of this method, speech currents are used in the submerged cable, thus making it possible at certain dangerous points in the channel to issue definite warnings, or instructions, from short sections of cable.

The errors to be expected in radio direction finding have been experimentally investigated and the results made public by Major C. Kinsley. The errors referred to are those which correspond to actual changes in the direction of the incoming wave rather than those due to remediable apparatus faults.

Miscellaneous Equipment.

A new form of synchronous commutator converter of alternating to direct current has been produced under Mr. Sewall Cabot's patents by the American Radio and Research Corporation. The forms of the

device produced so far are intended for the generation of high voltage direct current, and in particular, for feeding the plate circuits of transmitting vacuum tubes.

A considerable number of improved forms of audio frequency amplifiers, radio frequency amplifiers, tube detectors, and combinations of the foregoing have been recently produced by a number of the leading manufacturers. These are coming into increasingly common use in the commercial and amateur stations.

Radio Legislation.

The Preliminary International Communications Conference has gone into session at Washington recently. Representatives of England, France, Italy, Japan, and the United States constitute the membership. The Conference is charged with the task of drawing up recommendations to the International Communications Conference to be held in Washington in the Spring of 1921. Since the whole problem of long and short distance radio communication all over the world come within the scope of the activities of the Conference, their recommendations will be awaited with much interest by the radio field.

SOME OUTSTANDING PROBLEMS OF RADIO RECEPTION, WITH PARTICULAR REFERENCE TO INTERFERENCE

BY PHILIP R. COURSEY, B.Sc., A.M.I.E.E.

IN the reception of wireless messages many difficulties are experienced, for some of which solutions or partial solutions have been found, while for others no such success has yet been achieved. Of these difficulties the most serious has been that of interference, both tuned and untuned—the former from other radio stations and the latter from natural electrical disturbances or atmospherics.

The reduction of interference from other wireless stations can to some extent be effected by increasing the difference of wavelength between the interfering stations. This, however, is not a very practical solution. It entails a reduction in the number of stations that it is possible to operate in a given area. Owing to the great range of modern high-power stations working on long wavelengths, the “area” just referred to becomes the whole surface of the earth. A limit is thus placed upon the number of high-power transocean stations that can be erected on the earth if they are not to cause interference with each other.

For instance, suppose that when working between, say, 10,000 and 20,000 metres wavelength, which constitutes the present field for high-power work, it becomes necessary to stipulate that there shall be at least 1,500 metres between the wavelengths of any two stations. The maximum possible number of high-power stations in the world must then be limited to seven—a number which has already been considerably exceeded. One way out of the difficulty is evidently to increase the available range of wavelengths, but even this is limited in practical working, as the use of very long wavelengths entails the provision of excessively large and costly aerial systems.

An increase in the number of stations that can be operated between given wavelength limits can only be effected by increasing the selectivity of the receiving apparatus to render it immune from the effects of radiation on other wavelengths. Once again, however, there are practical limits, the most important of which arises through the wavelength changes consequent upon the mere act of signalling. When a uniform continuous wave is modulated by speech currents as in radiotelephonic transmission, the resultant (modulated) wave that is radiated has a variable wavelength, as is well known. The limits of the frequency variation are determined by the limits of the frequency of the impressed modulating currents. Likewise when modulating the waves into telegraphic signals there must be a similar frequency variation dependent upon the frequency of the current changes brought about by the telegraphic key. Each station then must radiate not one single wavelength, but all waves comprised between two limits closely adjacent to the normal unmodulated wavelength, commonly called the wavelength of the station.

As a consequence of this it is easy to see that the selectivity of the receiver cannot be increased indefinitely. It must remain sensitive

to the whole band of wavelengths that is emitted by the transmitter. Once again, then, there is a limit to the workable wavelength difference that it is possible to have between stations. Taking all things into consideration it is doubtful if more than eight to ten times the present number of high-power stations in the world could be worked satisfactorily.

Fortunately there remains another factor which has an important bearing upon this question. Directive reception is here referred to. If by appropriate design of the receiving aerial system it is possible to render the apparatus unresponsive to all signals save those originating in a given direction, a much greater number of stations can be operated in comparatively close proximity. Such directive reception can now be effected with at least partial success. By this it is meant that the apparatus can be made to be most sensitive to signals coming from one or two given directions, but that it still remains at least partially sensitive in others. By the use of directive receiving apparatus it is thus possible to augment the volume of traffic that can be handled by the high-power radio stations of the world.

The provision of an adequate duplex system between a pair of radio stations enables a further increase to be made in the work handled by those stations. This aspect of the subject is closely related to that of directional reception and transmission, and involves the provision of receiving apparatus that shall be immune to the tuned interference of the nearby transmitter, but responsive to the signal from the more distant station. One form taken by such a receiver includes the use of a system of balancing aeri—als—that is, one in which the receiving station is equipped with two aerial systems, one concerned mainly with picking up the long-distance signal, but being at the same time also responsive to the nearby impulses from the local transmitter, and the second designed to pick up the signal from the nearby transmitter only. A proper combination of these may be effected so that the strong local signals are cancelled out, leaving only those from a distance. This method was installed at the Marconi transatlantic stations some years ago.

With the more extensive development of the closed loop or frame as a receiving aerial, consequent upon the use of sensitive amplifying equipment, another and very simple arrangement has become possible.

A closed loop aerial is most responsive to a signal wave when the plane of the loop is oriented in the direction of the station from which the signals are emanating. As the plane of the loop is turned away from this direction, the amount of energy absorbed from the passing wave becomes less, falling to a sharp minimum or even to zero when the loop plane is perpendicular to the line joining the

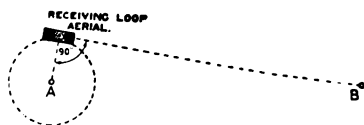


Fig. 1.

Arrangement of receiving loop aerial near the transmitting station. A=Local Transmitter; B=Distant Station.

two stations. Thus in order to ensure that a loop aerial used for reception from a distance shall be unaffected by a closer transmitting station it suffices to dispose it tangentially to a circle drawn with the local transmitter as centre, at such a point that its plane is in line with the distant station, Fig. 1. This method has also been used—notably in France—in regular transatlantic signalling.

Many other and more complicated arrangements—both in the form of special aerials, “barrage” receivers, etc., and of filtering apparatus to permit the passage of a given band of wavelengths only—have been developed and used under the stress of war conditions. Space will not permit of their full treatment here, but some further details may be found amongst the articles listed in the “Radio Literature” section included in this volume.

Apart altogether from the improvement of long-distance radio services by the reduction of interference from other stations, it is possible to effect an increase in their traffic capacity by augmenting the speed of transmission. In ordinary land line telegraphy it is now quite customary to employ high-speed sending apparatus in combination with a suitable recording receiver—which may take the form of a high-speed printer. The application of such high-speed apparatus to radio work is not, however, an easy task, and although some measure of success has already been achieved much more remains to be accomplished.

With modern transmitting apparatus of almost any type, there is little real difficulty in operating it at a fairly high rate of speed—say, of 100–250 words per minute—by an appropriate Wheatstone transmitter or similar form of control. The reception of these high-speed signals is the more difficult task. Good results have been secured by the use of dictaphone recorders for taking down the incoming signals on wax cylinders from which they can subsequently be transcribed by ear at a slower rate.

By the use of amplifying apparatus at the receiver, the incoming signals can be magnified sufficiently to operate some form of relay, thus enabling them to be recorded by any ordinary type of telegraph apparatus. Thus the possibility of the direct high-speed reception and printing of a radio message becomes evident, but the commercial application of this on an extensive scale yet awaits completion.

As a subsidiary to some such scheme of high-speed working as the above, the problems of automatically linking the wire and wireless telegraphs may properly be discussed. The direct control of the apparatus in a radio-transmitting station by telegraphic signals passed over an ordinary land-line telegraph presents no serious difficulty; the similar process at the receiving end of the wireless link is again the more difficult. One form of the solution is to be found in an adaptation of the automatic printing receiver to which reference has already been made. In one at least of these receivers when used for land-line working the received signals do not operate the printer mechanism directly, but control the working of a punching machine, so that a paper strip passing through the machine is punched with a series of holes corresponding with the Morse characters of the incoming message. Such a tape may, instead of operating the printer, be used to control another automatic transmitter for repeating the same message along a further stage of telegraph line. The successful operation of a punch-

ing machine of this type at the receiving end of a radio system would thus provide a means of passing the incoming messages straight on to the land-lines for further transmission from the radio "trunk-terminal" station directly to the town wherein the addressee of the message is resident. A considerable saving both in time and in operating costs might thus be affected with, at the same time, an increase in the utility of the radio system.

Possibly the more useful application of relaying apparatus to link the wireless with the land-lines is to be found in the case of radio-telephony. The enormous advantages of such linking are here obvious. The proper sphere of high-power radiotelephone stations then corresponds with that of the long-trunk telephone lines with the advantages of being able to traverse oceans as well as continents and with greater ranges than in the case of physical trunk lines. The communicating of the land-telephone lines with radio stations on ships and in the air is also included in any such scheme of linking.

It may also be interesting to note here that during the current year an installation has been opened at Catalina Island, off the Californian coast, to link up the island with the telephone system on the mainland. Any island telephone user can thus speak directly with any mainland telephone subscriber *via* the wireless system, and the automatic relaying apparatus. An apparatus for this purpose has also been devised by Marconi's Wireless Telegraph Co., in this country. In connection with this linking of wire and wireless networks some simplification of the difficulties of receiving and relaying may be lessened by the employment of "wired-wireless" transmission over the land-lines. The main principles of wired wireless work—that is the transmission of radio-frequency signalling currents along ordinary telephone or telegraph wires—have been known for a number of years, but their practical application in commercial apparatus has awaited the development of reliable thermionic valve apparatus. In Germany the method has now been applied to a number of trunk lines and is giving very satisfactory service, while some brief accounts have also been published of some American developments on similar lines.

As regards its application to the problem of linking wire and wireless transmission, it may prove advantageous at the radio-receiving station merely to amplify up the incoming signal-modulated oscillations by appropriate receiving amplifiers, and then to couple directly to the land-lines for transmission along them to the distant land station. At that point the ordinary repeating apparatus that has already been developed for relaying a subscriber's telephone circuit to a wired-wireless circuit would be employed. Thus the apparatus at the radio station might be simplified. The wired-wireless transmission need not necessarily be carried on at the same frequency as that of the waves received at the radio station, as a frequency changing unit of a heterodyne nature may be incorporated with the amplifiers.

In any and all of these arrangements here referred to precautions must evidently be taken against tuned interference from other radio stations. This aspect of the subject has already been discussed, but there remains another and more troublesome type of interference which at present constitutes what is perhaps the most serious obstacle in the development of long-distance radio work—viz., untuned interference from natural electrical disturbances or atmospherics.

These disturbances, or "strays," are also often referred to as "X's," and frequently also as "static"—the last particularly in America. The use of the term "X" dates back to the days of the early coherer receiver, when all messages were recorded on the tape of a Morse inker operated from the coherer and its attendant relay. On these tapes irregular and unintelligible marks were frequently found which from their unknown source and origin were termed X's. The development of the modern sensitive receiving apparatus has enabled it to be recognised that these X's are not all of the same nature, but it has at the same time rendered more difficult of solution the problem of the elimination of their effects. Some of them evidently originate in local thunderstorms and lightning discharges, but others have no such obvious source, and from their widely distributed nature they are supposed to be caused by electrical disturbances of the earth's atmosphere as a whole—possibly originating in some disturbance entirely external to the earth itself.

It has been found that the different types of atmospheric possess differing electrical characteristics, so that the elimination of the effects of each kind constitutes a different type of problem requiring a different solution. At the present time three main types are usually recognised, although the infinitely fine gradation of type renders classification difficult. They are generally known as: Grinders, clicks, and hisses. Of these, the first type is probably the most prevalent, and includes all the various miscellaneous sounds commonly associated with atmospherics other than those specifically described by the second and third designations. As a general rule the "click" variety of atmospheric arises through isolated lightning and similar electrical discharges in the atmosphere, while the "hisses" are due to static discharges from or to the aerial itself, such as may be caused by induction from highly charged clouds, by charged rain falling on the wires, or by snow squalls. It frequently happens, however, that the atmospherics heard partake of the characteristics of all three types, and this renders their classification not at all easy. This is often particularly the case with atmospherics arising from a nearby thunderstorm, the sounds in the receivers due to each discharge commencing with the hissing and sizzling of the preliminary bush discharges, continuing as a loud rattle as the breakdown extends through the air and often finishing with an extremely loud "click" when the actual "flash" occurs. There are also other forms characteristic of particular localities—especially the tropics—which seem to require special groups for themselves, and which offer special problems when the elimination of their effects is attempted. The third of the three main types mentioned above is as a general rule perhaps the least difficult to render harmless as far as the receiving apparatus is concerned. Since this class of sound *generally* arises through electrostatic induction it suffices to shield the aerial from such induction by an appropriate electrostatic shield or cage. For this purpose the aerial wires are disposed in the interior of a metallic network which is maintained at earth potential. If this shield is constructed of a continuous network of copper wires, wire netting or similar material, it is generally found that too much energy is abstracted from the signal waves, so that the intensity of reception is considerably reduced. An alternative is to build the network either of resistance wire, or in a number of separate sections electrically united through resistances, which serve to prevent the establishment of any considerable oscillating currents in

the network while maintaining the parts all at approximately earth potential as far as electrostatic induction effects are concerned.

As regards the other forms, the difficulty of the separation of the signal from the atmospheric disturbances lies mainly in the close electrical similarity between the currents set up in the aerial system by the two causes. In the great majority of cases the action of an atmospheric impulse on the aerial system partakes largely of the nature of what may be termed an electrical blow or impact. It is well known that if a sharp blow be imparted to any material body capable of vibrating—such as a spring, a bell, or a pendulum—it will be set into oscillation with its own natural vibration frequency almost independently of the characteristics of the impact. The vibrations thus set up will decrease in amplitude in accordance with the natural decrement of the vibrating system, unless the case is complicated by the frequent recurrence of the impulsing blow, such as would usually take place in the electrical case. The electrical oscillations set up in the receiving aerial will thus possess practically the natural oscillation frequency to which the aerial circuit is tuned, and will generally have a decrement proper to that circuit. Since, however, the aerial circuit is customarily tuned up to the wavelength of the signals to be received, it is evident that both signal and atmospheric currents will possess practically the same characteristics, and their separation by any ordinary method of tuning is rendered very difficult.

Perhaps the simplest solution—or at least partial solution—of the trouble is to be found by omitting this tuning of the aerial circuit to the signals, so that the natural oscillations set up by the atmospherics will thus be given a frequency different from that of the signals it is desired to receive. The incoming signals if their decrement is very small—or preferably if they are sent with sustained waves (C.W.)—will be able to force an oscillation in the aerial circuit of their own frequency, and thus affect the tuned secondary circuit coupled to the aerial. This coupling must be a very weak one, or the atmospherics will impulse the secondary directly. At least a partial separation of signal from the atmospherics is thus possible.

Many variations of this idea have been suggested—using either a single aerial with two or more separate branches to earth, or two or more aerial systems, one of which can be tuned to the signal and the other detuned. But a very indifferent separation can as a rule be obtained by any of these arrangements as they nearly all overlook the fact that if the two branches of the aerial system, or the two separate aerals, are tuned to different frequencies, the currents set up in them by the atmospheric impulses will have the frequencies of those branches, so that being different they can never accurately neutralise one another when the two aerial circuits are combined together in opposition to one another. The signal currents *should* remain since they are set up in one aerial circuit (the one tuned to their wavelength) only, but usually a very considerable proportion of the original disturbances remains too.

An improved arrangement has been devised, designed with a view to overcoming this difficulty of non-equality of the frequency and waveform of the currents in the two aerial circuits. The principle of this method is that the two circuits are not coupled directly to the receiver, but through a form of frequency changer—which for

convenience may take the form of a heterodyning valve. This frequency changer is so arranged that currents having the frequency of one of the aerial circuits will be changed to equality with that of the other, to enable a more precise neutralisation to be secured. When a valve is used to effect this transformation its oscillation frequency must be adjusted so that one of the beat-frequencies between one aerial circuit and the local oscillation is the arithmetic mean of the frequencies to which the two aerial circuits are tuned.

Attempts to solve the problem of receiving radio signals through atmospherics have also been made along other lines with at least partial success. Some only of these methods can be briefly indicated here.

As an alternative to trying to *eliminate* the effects of the atmospherics, it is possible to arrange apparatus that will limit the response of the receiver to a certain definite maximum, and thus prevent the signal being entirely drowned out by an atmospheric of several times greater intensity. The valve limiter of G. M. Wright, and the balanced crystal, balanced valve and similar types of receivers may be mentioned in this connection as examples of what has already been

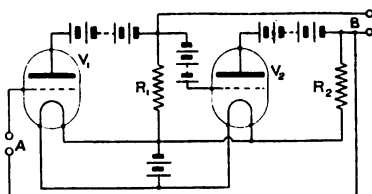


Fig. 2.

General scheme of Turner's "Kallirotron" Limiter.

accomplished. A new arrangement of valve limiter has recently been devised by L. B. Turner, and termed by him a "Kalliroton Limiter," which may prove useful for work along these lines. The general arrangement of this limiter is shown in Fig. 2. Two valves, V_1 , V_2 , are used, arranged in cascade after the manner of a two-stage amplifier for very low frequency, or D.C., amplification. The output circuit of V_2 is, however, led back again to the input of V_1 , so that the input

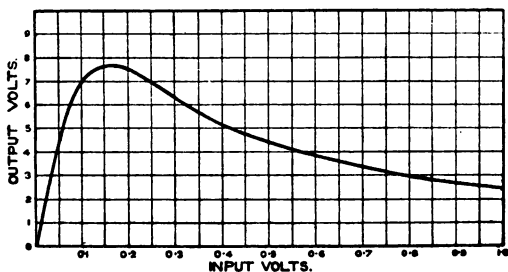


Fig. 3.

Typical Output curve for the "Kallirotron" Limiter.
(This particular curve corresponds to a "weak-signal magnification of $\mu = 100$.)

terminals of the two-valve unit become those marked A, while the output is joined on at B. The great advantage of this limiter over those of the dimmed filament type, in which the intensity of response is limited by reducing the saturation current of the valve, is that if the impressed impulse exceeds the critical maximum, not only does the output not increase, but it actually decreases, Fig. 3. An extra strong atmospheric should thus produce less effect on the receiver than a signal of lesser intensity.

Reference has already been made to the advantageous effect of receiving aerial systems having directional properties upon the traffic capabilities of high-power stations. A directional aerial system enables the tuned interference from other stations to be lessened, and as a consequence the stations to be worked with a smaller wavelength difference between them. Such aerial systems are also advantageous from the point of view of atmospheric disturbances. Since they are most responsive to signals arriving from certain directions, they will also receive the effects of atmospherics with the greatest intensity from those same directions. This, therefore, means that such aerials will receive less interference from atmospheric disturbances propagated from places not lying in the plane of maximum reception. The total disturbance of the station by atmospherics is thus

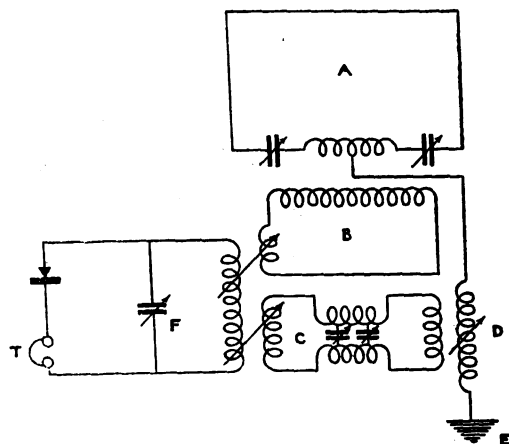


Fig. 4.

Receiver using a loop aerial both as a closed loop and as an open antenna, to lessen the effect of atmospherics.

reduced to some extent. These remarks apply to all forms of directional receivers, but with greater force to those having a polar reception curve which departs most from the circular form. The polar curve may be further distorted by making the aerial system have a maximum reception in one direction only instead of in two, as is most usual. One method by which this may be effected is shown in Fig. 4, which illustrates a loop aerial A used both as a closed and as an open circuit receiver. The energy of the currents set up in the loop A is transferred to the detector circuit F, through the closed circuit B. The

Some Outstanding Problems of Radio Reception

loop as a whole as an elevated aerial having capacity tuned up by the coil D, and the energy of the currents in the coil is also transferred to the detector circuit F. This is effected through the circuit C which contains a means for adjusting the phase of the currents.

The operation of a circuit of this type may be explained not only to its greater directive properties, but also to its ratio of signal strength to atmospheric strength in the ratio of aerials. Thus suppose in the case of the closed loop strength may be represented by (x_1S) and the atmospheric strength is (x_2S) and the atmospheric strength (y_1A) , the receives $(x_1S + y_1A) - k(x_2S + y_2A)$, and by adjusting the couplings between the circuits we can make y_1 the resultant effect upon the detector may be expressed as kx_2x_1 , as the ratio x/y is different in the two cases.

Thus, apart altogether from any directional effect on themselves, it is possible to obtain at least a partial solution of the problem of atmospheric elimination by combining together having different electrical characteristics. In this connection results have been obtained by a combination of a loop aerial—that is one consisting of one or more loops buried in the earth or immersed in the sea or in a river. experiments of this type have been described by A. Hoy it is claimed that quite good results are obtainable. forms of anti-atmospheric devices described by R. A. of the loops is to form two aerial systems having different signal strength to atmospheric strengths, so that when combined together the resultant currents contain a preponderant signal. A good summary of this aspect of the subject in a recent paper by G. W. Pickard (*Proceedings of the Radio Engineers*, October, 1920).

In connection with this problem, some reference has been made to the difficulties of separating the signals from the noise entirely by means of the tuning of the circuits. The selection means will, however, be the greater the smaller is made the resistance of the circuit. The use of the three-electrode tube has provided radio workers with a means of reducing the effective resistance of any given circuit, or even of making it zero or to a negative value in certain circumstances.

Whenever a triode tube is provided with reaction coils and grid circuits in such a manner as to tend to increase the effective resistance of the circuits to currents of the particular frequency for which the circuits are tuned. The effect of such reaction is expressed as the addition of so much negative resistance to the circuit, since the actual ohmic resistance of the circuit must necessarily remain the same. Hence if such devices are incorporated into the radio receiving circuits it will be possible

loop as a whole as an elevated aerial having capacity to earth is tuned up by the coil D, and the energy of the currents flowing in this coil is also transferred to the detector circuit F. This transference is effected through the circuit C which contains a means of adjusting the phase of the currents.

The operation of a circuit of this type may be explained as due not only to its greater directive properties, but also to the difference in the ratio of signal strength to atmospheric strength in the two types of aerials. Thus suppose in the case of the closed loop the signal strength may be represented by (x_1, S) and the atmospheric strength (y_1, A) ; whereas when the loop is used as an elevated aerial the signal strength is (x_2, S) and the atmospheric strength (y_2, A) , then the detector receives $(x_1, S + y_1, A) - k(x_2, S + y_2, A)$, and by adjusting the variable couplings between the circuits we can make $y_1 = ky_2$ so that the resultant effect upon the detector may be expressed as $(x_1 - kx_2) S$, showing that the effect of the atmospheric has been cancelled out, since kx_2/x_1 , as the ratio x/y is different in the two cases.

Thus, apart altogether from any directional effect of the aerials themselves, it is possible to obtain at least a partial solution of the problem of atmospheric elimination by combining together two aerials having different electrical characteristics. In this connection, good results have been obtained by a combination of a loop aerial with a buried aerial—that is one consisting of one or more insulated wires buried in the earth or immersed in the sea or in a river. A number of experiments of this type have been described by A. Hoyt Taylor* and it is claimed that quite good results are obtainable. The various forms of anti-atmospheric devices described by R. A. Weagant may be placed in this class, since the effect of the particular combinations of the loops is to form two aerial systems having different ratios of signal strength to atmospheric strengths, so that when they are combined together the resultant currents contain a preponderance of the signal. A good summary of this aspect of the subject may be found in a recent paper by G. W. Pickard (*Proceedings of the Institute of Radio Engineers*, October, 1920).

In connection with this problem, some reference has already been made to the difficulties of separating the signals from the atmospherics entirely by means of the tuning of the circuits. The selection by this means will, however, be the greater the smaller is made the effective resistance of the circuit. The use of the three-electrode thermionic tube has provided radio workers with a means of reducing indefinitely the effective resistance of any given circuit, or even of reducing it to zero or to a negative value in certain circumstances.

Whenever a triode tube is provided with reaction between the plate and grid circuits in such a manner as to tend to set up oscillations, the effect of such reaction is equivalent to a reduction of the effective resistance of the circuits to currents of the particular frequency for which the circuits are tuned. The effect of such reaction may, therefore, be expressed as the addition of so much *negative* resistance to the circuit, since the actual ohmic resistance of the wires, etc., must necessarily remain the same. Hence if such devices are incorporated into the radio receiving circuits it will be possible to bring

* *Proceedings of the Institute of Radio Engineers*, August and December, 1919 (*Radio Review*, Abstracts Nos. 149 and 313), January and April, 1920.

about a reduction of their effective resistance to currents of a particular frequency, whereas to other frequencies no such reduction is obtained. A circuit offering a resistance of many thousands of ohms to currents of most frequencies, can in this way be made to show an effective resistance of but a few ohms to sustained wave signals of the correct frequency. Such arrangements are evidently of use in reducing the interference in the receiver due either to other tuned wireless stations or to atmospheric disturbances.

Some further selection of the signal from interfering currents may be effected by the addition of filtering circuits to the receiver, such circuits being designed to allow the passage through them of currents of the desired frequency only, and suppressing all others. The early Marconi X-Stopper belonged to this class, while, as more recent examples, may be mentioned the circuits patented by the Western Electric Co. (U.S.A.). These are designed to permit the passage through them of a narrow band of frequencies. Each filter consists of a series of units consisting essentially of a resistance in series with a condenser. If the output circuit is joined across the terminals of the condenser, the p.d. impressed upon it will fall if the frequency increases, whereas if it is connected across the resistance the reverse action will take place. Hence by connecting two such units in series it is possible to arrange matters so that the potential impressed upon the output circuit is reduced for any change in the frequency of the impressed currents whether increase or decrease from the critical value.

A filtering circuit that has been developed in France operates upon a somewhat different principle. It consists in the main of a series of closed loop circuits containing inductance and capacity, and so disposed that a stationary wave can be established along the series by an impressed e.m.f. of the correct frequency. The presence of this stationary wave can be made evident by its effect upon a suitably arranged amplifying and detecting apparatus coupled to the filter circuits. Currents or impulses of any other frequency or wave-form will not serve to establish such a stationary wave, with the result that their effect upon the detecting apparatus is reduced. This, again, is an arrangement adapted to protect the receiver from interference of both the "tuned" and "untuned" variety.

Apart from those referred to in the above outline, there are many other problems relating to the reception of radio messages for which but partial solutions have been obtained and which as a result await the result of further research work. Of these perhaps the most important from the point of view of the navigator—both on sea and in the air—is that of producing a receiving apparatus that shall give an indication not only of the direction of the transmitting station, but also its distance. Up to the present the only solution at all effective for this purpose, when only one receiving station is available, consists in a combination of wireless and acoustic transmission (through the air or under water), but a consideration of these schemes is outside the scope of this article, as are also those relating to the development of apparatus for recording wireless time and other signals that may be employed for astronomical purposes and for the determination of the longitude of places on the earth's surface.

THE RADIO COMPASS

BY STUART BALLANTINE.

I.—INTRODUCTION.

THE radio compass, direction finder, or goniometer, as it is variously denominated, is a device used to determine the direction of a source of radio signalling waves. If two radio compasses operate together, and are situated some distance apart, a plot of their individual observations gives two intersecting lines which fix the location of the transmitting station. Thus the usefulness of the device is considerably extended, enabling not only direction finding but "location finding" to be carried on.

The great variety of uses to which a device of this kind may be put will be evident. As a military and naval instrument in time of war, for example, furnishing detailed information about the radio activities of an enemy on land, on sea or in the air, the service it performs is unique; nor does its value end here, for in times of peace as an aid to the navigation of vessels, it has, perhaps, its most utilitarian applications. The great value of the radio compass is reflected by its phenomenal development and the steadily increasing numbers of stations in routine operation. In 1913 there was but a handful of such stations in actual use; in 1920 we find our coasts literally covered with them. This feverish development is due in some measure, of course, to war stimulus; but the real reason is the contemporaneous improvement in vacuum tube amplifiers. This is particularly true of the type of compass which I shall refer to in this article as the *rotating coil type*.

In present practice, we find two types of direction finder in use. The first type, the Bellini-Tosi instrument, is rather well known since many articles dealing with its description and operation have appeared. This ample literature provides little excuse for any mention of it here; furthermore, while some accounts of recent experimental developments are at hand, I refrain from reproducing this material for ethical reasons. The newer apparatus, concerning which little or nothing has been published, will be referred to as the *rotating coil type*. This device consists of a relatively small coil, usually a multi-turn coil, so arranged mechanically that it may be rotated about a vertical axis, and to which suitable tuning and detecting apparatus is connected. The coil is exposed to the radiation from the transmitter; the auxiliary apparatus below in the operating room is shielded from this radiation by a large Faraday cage.

Important advantages of this type of compass are its economy of space, its portability and the ease with which it may be installed in almost any place. These result from the small dimensions of the coil, which, however, also produce a receiving system of incredibly low efficiency; hence enormous amounts of amplification are necessary before a workable signal is obtained. The vacuum tube multi-stage amplifier is therefore essential to the successful employment of such small coils for direction finding purposes; and, until reliable amplifiers were produced the outlook for any extended practical application was cheerless indeed.

The inherent merits of this type of compass seem to have been recognised early by both America and France and the developments

made quite independently in these countries are largely responsible for its present efficiency and wide practical use. In America, most of this work has been performed under the auspices of the Navy Department, and, for the past three years, I have been pleasantly engaged in directing it. The present article is written on the basis of this experience; and, although for this reason lacking comprehensiveness from the general direction finder point of view, will at least furnish the reader with a glimpse of the radio compass in American practice.

We will dispense with the conventional historical background mainly because experience has demonstrated conclusively enough that historical comments have no didactic value and furnish only a nidus for unpleasant controversy. Since the time of Hertz, who undoubtedly used the first direction finder in his classical experiments with electric waves, many minds have contributed in the evolution of the existing device. A bare catalogue of these workers, even if a suitable list was at hand, would probably consume our entire space and even then fall short of doing complete and universal justice.

II.—THEORY OF OPERATION OF THE IDEAL DEVICE.

In order to understand the principles upon which the radio compass operates let us consider briefly the radiation of electric waves from the simple vertical wire system portrayed in Fig. 1.



Fig. 1.—*Electric and Magnetic Forces in Wave from Vertical Antenna.*

When excited the antenna radiates electric waves into the surrounding ether. The peculiar structure of these waves is well known: At some distant point on the earth's surface, the *electrical force* is vertical and the *magnetic force* is horizontal. These forces will be mutually at right angles to the direction of propagation. They may be represented at some instant of time as suggested in Fig. 1. It is to be observed that the magnetic force is normal to the direction of propagation and to the

direction of the transmitting station.

The effect of a wave of this simple type upon a radio compass coil system located at the point may be discussed from either the electrical or magnetic points of view. The magnetic is somewhat more convenient and furnishes a better physical picture. It is well known that when a magnetic flux threads through a coil it induces therein an e.m.f. proportional to the time rate of change of the flux. In the present case of sinusoidal fields, this time rate is proportional to the number of lines of flux which the coil embraces. Suppose that all of the turns on the coil lie in parallel planes. Then if the coil is so positioned that its plane (the plane of the windings) is parallel to the magnetic lines (see A, Fig. 2) none of the lines will actually thread through the coil and there will be no e.m.f. induced. If the coil is rotated so that its plane is normal to the magnetic flux, the greatest number of lines will be embraced and the induced force will be a maximum. This position of the coil in the field is shown at B, Fig. 2.

As the coil is rotated through one complete revolution (360°) the induced e.m.f. is maximum twice and minimum twice. By observing the positions of the coil corresponding to either a maximum or a minimum e.m.f. we can deduce the direction of the flux, and, assuming that the field has not been distorted, we can also find the direction of the transmitter.

In order to perceive these changes in the induced e.m.f. we may connect a suitable detector and telephone set to the coil terminals. A better response will be obtained, of course, if the system is tuned by means of a variable condenser. These connections for a simple type of compass are delineated in Fig. 3.

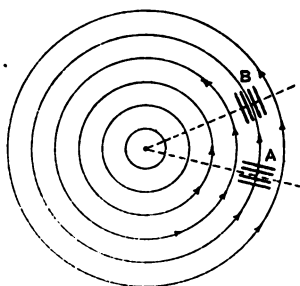


Fig. 2.—Positions of Coil in Field Corresponding to Maximum and Minimum Induced E.M.F.S.

I have explained very cavalierly what happens when a coil is placed in the path of an electric wave and rotated. This may be summed up as follows: The signal received is maximum when the plane of the windings (or the effective electrical plane when the turns are not regular and in parallel planes) is normal to the magnetic force; and zero when it is parallel to the magnetic force. The application of the device as a direction finder is obvious.

e.m.f. varies as the coil is turned. It is rather apparent that if O represents the angle between the plane of the coil and the magnetic force, the induced e.m.f., E , will vary as the sine of this angle; or

$$E = E_o \sin O \quad (1)$$

This is represented graphically in Fig. 4.

This curve, which represents the mode of variation of E with O , is termed a *characteristic curve*. In the present case, it is a pure figure-of-eight, symmetrical with respect to quadrature axes; therefore, it may properly be termed a *bilateral characteristic*. In cases where the two lobes are not identical, we have

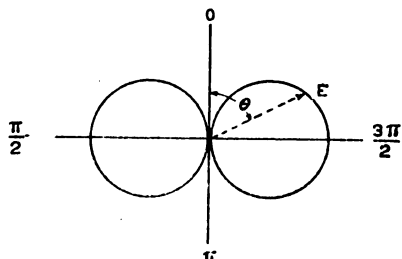


Fig. 4.—Bilateral Characteristic of Simple Coil.

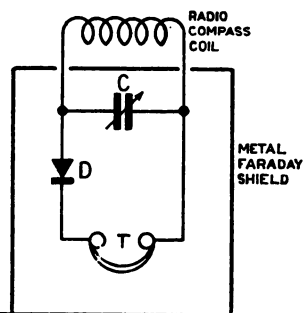


Fig. 3.—Connections of Single Radio Compass.

symmetry with respect to one axis only and the curve may then be termed *unilateral*. Of this I shall have more to say later.

On account of the double symmetry of the simple coil the true or *absolute* direction of the transmitter cannot be determined directly. Suppose it is decided to use the point of minimum signal for taking observations. As the coil is turned, the signals will be extinguished at two points, 180° apart. We are immediately

at a loss to say which one of these corresponds to the absolute direction; we have located the direction of the *line of bearing* but there remains an ambiguity of 180° . All readings taken by this bilateral method of

operation will be uncertain to this extent. In many cases this is not serious; for example, if the station is located on the coast line most of the signals will arrive from the direction of the sea and the inland reading is at once discarded; or if two stations operate co-ordinately, their plotted bearings will converge in the proper direction and the ambiguity is removed at once. The disadvantages of bilateral operation become pronounced, however, in the case of ship installations, and the need for some means of differentiating between the two directions is in many cases keenly felt. A ship getting bearings upon a land station, from an approximate knowledge of her heading, may be able to make a proper discrimination; but when taking bearings upon another ship on the high sea there are few indications as to which of the two readings is the correct one. Many methods of avoiding this dilemma have been devised: and I will discuss one which has been used by the U.S. Navy, and which appears to be well suited for service use.

UNILATERAL OPERATION: If, after we have determined the *line of bearing* by the usual bilateral method, we can destroy the symmetry of the figure-of-eight characteristic, our problem is solved. A suitable destruction of symmetry might consist, for example, in making one lobe of the characteristic larger than the other—or one maximum, so to speak, more maximum than the other. We would then have something like the curve in Fig. 5.

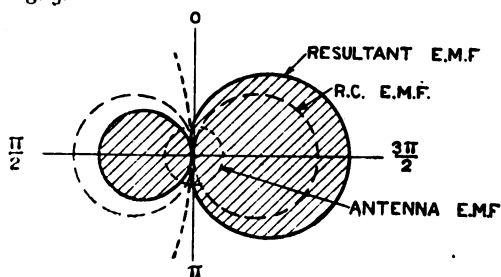


Fig. 5.—Unilateral Characteristic.

This cannot be accomplished, however, without displacing the minima. We care very little about this; after the line of bearing has been determined, all we require is a general intimation of the true bearing. We may arrange the circuit so that the position of the coil corresponding to the greater maximum will indicate the true direction; this done, we proceed to determine the accurate bearing by casting off the imperfection of the bilateral characteristic and investigating this region. The null point, or minimum, is used because it can be located with much greater accuracy than the point at which the signals are a maximum. Two dials, suitably divided into degrees from 0 to 360 are required. These are displaced exactly 90° from each other; one being used for the general direction (when the maximum is used) and the other for bilateral operation (using the minimum).

Any feasible method for producing a recognisable amount of dissymmetry may be used. The one which I propose to describe is shown diagrammatically in Fig. 6.

The antenna consists of a short vertical wire erected along the axis of the coil. The purpose of this is to insure that the phase of the e.m.f. induced is in quadrature with that operating in the coil circuit. Now the

antenna e.m.f. does not vary with the direction from which the waves are arriving. That in the coil does, as we have seen, and reverses when the coil is reversed—that is, turned through 180° . It will be evident that if we add to the coil e.m.f. another e.m.f. in phase and of constant value, we will get an increased effect on one maximum and a decrease on the other. The amount of dissymmetry so produced may be adjusted by altering the value of the extra e.m.f. The antenna supplies this force, and it is introduced into the coil circuit in the proper phase by means of the variable coupling transformer M. A very small amount of biasing force is needed, since the efficiency of the coil itself is quite low; therefore, a short antenna suffices. The coil may be used as its own antenna, with suitable connections. The antenna circuit is preferably tuned to the incoming wave so that the current flowing is substantially in phase with the e.m.f. In Fig. 6 is exhibited a typical unilateral characteristic, biased by this method. The coil e.m.f. is represented by the dashed curve; the antenna e.m.f. by the dotted curve; and the resultant by the heavy curve. Since the e.m.f.'s. are in phase, they are added algebraically. Unilateral compasses of this type are used only on shipboard: as explained previously, the need at shore stations is not great and the bilateral coil is preferred for its simplicity.

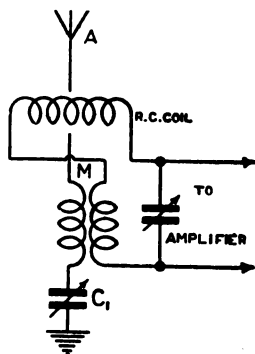


Fig. 6.—Arrangement for Unilateral Operation.

III.—THEORY OF THE PRACTICAL DEVICE.

To secure greater clarity in discussing the theory of the simple compass, we have purposely postulated a plane wave acting upon the coil, and a perfect coil system; conditions which are not realised in actual installations. The departures from ideal operation may be divided into two classes—those due to defects in the apparatus itself, and those caused by distortion of the wave. We will further restrict the discussion of the latter class of effects to those produced directly by the environs—in other words, we suppose that the wave is plane before reaching the neighbourhood of the coil.

DEFECTS IN THE APPARATUS: The success of the radio compass depends primarily on two things: securing a strong signal and a well defined minimum, or point of extinction. All bearings are secured by observing the position at which the signal is minimum; hence a perfect minimum* is essential to accuracy. With weak signals, the probable position of the minimum must be judged by rotating the coil to one side until the signal becomes audible and then rotating it to the other side until a signal is again heard and taking the mean of these positions. This interval of silence, the boundaries of which we endeavour to locate by this method becomes smaller as the field strength increases, and, as I shall show in a later section, the accuracy of the observations improves. Not only from this point of view should the signal be strong, but the range of operation is directly affected thereby. With a poorly defined minimum, however, a strong signal is of little value. The strength of the signal for a given field can be brought to its best value by proper circuit design, reinforced by amplification pushed to the practical limit.

* By a *perfect minimum* is meant one in which the extinction is complete, *i.e.*, a real *null* point.

IMPERFECTION OF THE MINIMA: The most significant factor in the destruction of the null point in the practical compass is an effect which I shall term the *antenna effect*. Consider the situation figured below (Fig. 7).

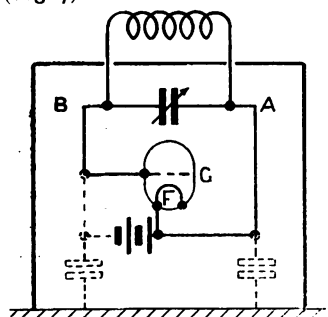


Fig. 7.—Electrical Disymmetry of Compass Circuit.

Here the radio compass is installed over a symmetrical Faraday cage containing the apparatus and operator. This shield protects the parts of the circuit which do not rotate with the coil—leads, amplifier, etc.—from the field; thus errors of this origin are avoided. The terminal of the coil designated by *A* is connected to the filament side of the vacuum tube (amplifier or detector); the side marked *B* is joined to the grid. Now on account of the unequal capacities to earth of the filament and grid circuits, a certain amount of electrical disymmetry exists. The coil, therefore, functions both as an *open oscillator* and a closed one at the same time. When it is placed so that the signal would normally be zero, that is, when the induction into the coil is zero, there remains the effect due to the antenna action. The e.m.f. across the tuning condenser from this cause is usually in quadrature to that due to the normal coil action. The magnitude of this quadrature e.m.f. depends upon the disymmetry. The natural disymmetry caused by the connection of the vacuum tube is unavoidable in practice; and has the serious effect of filling the minimum with signal, thereby dulling it and rendering its precise location difficult.

By restoring the symmetry of the system artificially, the antenna action may be eliminated and all traces of signal at the null point may be removed. This may be conveniently done by connecting a variable condenser between the low capacity terminal and the earth. It should be noted that capacity differences may be brought about in other ways than the one described; a disymmetrical coil, or a coil with unused turns connected to one end, are frequent offenders. Another type of unbalance which causes trouble is that due to unequal leakages between the terminals of the coil and earth. This is more serious since the e.m.f.'s to which it gives rise are not in quadrature with the true radio compass effect; their quadrature components have the effect described while the in-phase parts *shift* the minima. This latter effect is really serious. Leakage may be avoided in properly designed installations; or it may be compensated by an artificial leak, if it is impossible to restore the insulation.

Proper *tuning* of the circuit in the presence of antenna effect is extremely important. Normally, as noted above, the antenna e.m.f. and the radio compass e.m.f. are in quadrature, but if the tuning of the circuit is defective the radio compass e.m.f. across the condenser will depart from this pure quadrature relationship. The result of this is that while perfect null points may be secured by compensation, they will no longer retain their positions 180° apart. This is particularly deleterious because the operator receives a false impression of security from the perfect null points, and has no reason to suspect that they have shifted. I have been unable to secure shifts as large as 10° by improper tuning at standard shore stations. This source of error has been successfully combated by

having the operator first rotate the coil off the minimum until signals are obtained, then tune with the condenser, afterwards back to the minimum and adjusting the compensator until the null point is secured. Since an adjustment of the compensator changes the total capacity across the coil and thus affects the process is repeated; the coil being swung off, retuned, and the minimum, re-compensated. Usually a second approximation sort provides the necessary immunity from minima shifts.

Exact *opposition of the minima* is desirable but not essential for successful use of the compass. In taking the observations the null points is used and so long as its position remains fixed with the plane of the turns there is no difficulty. As a matter of opposition with coils of the single layer rectangular type obtained. There are many reasons for this, chief among them the effect of the spacing of the turns. If this is to be avoided the turns must be close together, or the better method of transposing the turns is employed. In this method the loss in efficiency due to bunching is avoided. The departure of the minima is more pronounced in degenerate coil forms; the so-called "pancake" coil being a case in point; and it is difficult to correct.

Another effect of passing interest in coils of this type is the *spacing between the turns* is an effect which I will term the *effect*. Suppose that the coil is in the position of normal minimum then the true radio compass effect is zero. Now if the turns are a slight reflection shows that there is a loop, closed however by the distributed capacity between the end turns. The result is that across the tuning condenser in quadrature with the radio compass effect (or in-phase with the antenna effect e.m.f.) which reverses the coil is turned from one minimum to the other. At one end the coil opposes the antenna e.m.f.; at the other it aids it. This is the consequence since it is quadrature and causes no shift in the null point; it merely causes the compensation to be different on the two sides.

These are the main effects that are likely to be encountered in installations. There are others, of more or less importance, under peculiar circumstances of installation. No discussion will be attempted because they do not have to be tolerated.

CIRCUIT DESIGN: In a foregoing paragraph emphasis was laid on the importance of securing the best possible signal. This is accomplished in two ways; by amplification and proper circuit design. Both are important; the amplifier does not constitute a panacea since there are practical limits to the number of stages that may be reliably employed. In *audio frequency* systems the number of stages must stop at the point where tube, battery and side noise become unpleasant, and in *radio frequency* systems the number of stages is limited by natural retro-active effects; so that after amplification has reached the limit, further improvements can be effected only by careful design. A great deal might be said on this subject, but in space I shall be able to dwell only on the cardinal considerations.

The amplifier is stimulated by the voltage across the tuning condenser; hence this is to be made as great as possible. The voltage across the condenser, E_c , we have them

$$E_c = \frac{E}{R\sqrt{L}}$$

having the operator first rotate the coil off the minimum until fairly loud signals are obtained, then tune with the condenser, afterwards swinging back to the minimum and adjusting the compensator until a perfect null point is secured. Since an adjustment of the compensator capacity changes the total capacity across the coil and thus affects the tuning, this process is repeated; the coil being swung off, retuned, and after return to the minimum, re-compensated. Usually a second approximation of this sort provides the necessary immunity from minima shifts.

Exact *opposition of the minima* is desirable but not essential to the successful use of the compass. In taking the observations but one of the null points is used and so long as its position remains fixed with respect to the plane of the turns there is no difficulty. As a matter of fact, exact opposition with coils of the single layer rectangular type, is seldom obtained. There are many reasons for this, chief among which is the effect of the spacing of the turns. If this is to be avoided the turns should be close together, or the better method of transposing them may be employed. In this method the loss in efficiency due to bunching the turns is avoided. The departure of the minima is more pronounced in degenerate coil forms; the so-called "pancake" coil being an example of this; and it is difficult to correct.

Another effect of passing interest in coils of this type due also to the spacing between the turns is an effect which I will term the *displacement effect*. Suppose that the coil is in the position of normal minimum signal; then the true radio compass effect is zero. Now if the turns are spaced, a slight reflection shows that there is a loop, closed however, on one side by the distributed capacity between the end turns. The result is an e.m.f. across the tuning condenser in quadrature with the radio compass e.m.f. (or in-phase with the antenna effect e.m.f.) which reverses in sign when the coil is turned from one minimum to the other. At one minimum it opposes the antenna e.m.f.; at the other it aids it. This is of no serious consequence since it is quadrature and causes no shift in the minima; it merely causes the compensation to be different on the two minima.

These are the main effects that are likely to be encountered in proper installations. There are others, of more or less importance, which occur under peculiar circumstances of installation. No discussion of this class will be attempted because they do not have to be tolerated.

CIRCUIT DESIGN: In a foregoing paragraph emphasis has been laid on the importance of securing the best possible signal. This may be accomplished in two ways; by amplification and proper circuit design. Both are important; the amplifier does not constitute a panacea for poor circuit design since there are practical limits to the number of stages that may be reliably employed. In *audio* frequency systems the cascading must stop at the point where tube, battery and side noises become unpleasant, and in *radio* frequency systems the number of stages is limited by natural retro-active effects; so that after amplification has been pushed to the limit, further improvements can be effected only by careful circuit design. A great deal might be said on this subject, but in this limited space I shall be able to dwell only on the cardinal considerations.

The amplifier is stimulated by the voltage across the tuning condenser; hence this is to be made as great as possible. Designate it by, E_c ; we have them

$$E_c = \frac{E}{R} \sqrt{L}, \quad (2)$$

where E is the induced e.m.f., and R the effective resistance of the circuit (including the radiation resistance, coil loss resistance and the effect of the input impedance of the vacuum tube). L and C have their conventional meanings. The expression is true only for mono-periodic fields, i.e., for "arc" signals; when "spark" reception is to be considered the equation for E_c is more complicated, but to a sufficient practical approximation we may use the expression (2). The induced e.m.f. is given by:

$$E = \frac{240 \pi I_{shs} \ln}{\lambda \pi} \sin \frac{\pi d}{\lambda}; \quad C = E \sin \left(ut + \frac{\pi d}{\lambda} \right). \quad (3)$$

For coils of small dimensions compared to the wavelength we may write:

$$E_c = A \frac{n d}{R \lambda} \sqrt{\frac{L}{C}} \quad (4)$$

where A depends upon the field strength at the point where the coil is situated. For shipboard installations the maximum coil section is specified so that the variables under control are the number of turns, the conductor, and the spacing between turns. If operation on a stipulated wavelength is to be attempted, we can design the coil so that E_c is greatest at this wavelength; if some range is desired it is necessary to provide switches to change the number of turns in use so that E_c may be kept high over the entire range. We will suppose that the specified operating wavelength is 800 metres.*

A choice of conductor is first made, giving proper consideration to both its high frequency conductivity and mechanical suitability. In terms of remaining variables we have:

$$E_c = K_1 \frac{n}{R} \sqrt{\frac{L}{C}} \quad (5)$$

L and R are functions of the number of turns and their spacing. C is related to L by $\lambda = a \sqrt{LC}$, so that:

$$E_c = K_2 \frac{n L}{R} \quad (6)$$

We may find experimentally the actual functional relation between L , R and n . After computing E_c from (6) and these results and plotting it as a function of n (including the spacing as a parameter) the optimum number of turns and the proper spacing is easily chosen.

This rather simple example illustrates the general method of procedure. When a number of wavelengths are to be used and the coil section is not restricted, the number of variables is increased and the experimental work is much more laborious. The correlation is, however, quite easily carried out.

INFLUENCE OF THE ENVIRONS: Thus far in order to see more clearly how the operation of the actual compass departs from theoretical expectations, we have postulated that the wave acting upon the coil was undistorted from the plane form; also that the surroundings of the coil were ideal. We have found that the practical coil, carefully designed and installed, and properly compensated, behaves very much like the theoretical coil described in the first paragraphs. Equipped with this information we may examine the effects of the environs.

From this point of view we may define an ideal installation as a coil mounted over an infinite conducting plane. The wave in travelling from

the transmitter to the coil is guided by this plane. Under the and provided also that the coil is sufficiently far removed from the transmitter that the field is substantially pure, the compass true direction of the transmitter. If the source were moved about the coil within sight, and the visual and radio bearings we would probably find perfect agreement between them. are seldom so ideal in practice. The nearest approach to of this kind is a coil installed on a small wooden boat of the "chaser" type and signals travelling across the sea water. C on these boats operate with very small error.

I shall discuss here two types of installation—those ashore (for navigational purposes), and those on board ship. The conditions encountered in each case are widely different; also there is, of course, considerable difference in both the ship and shore installations. On land there are no restrictions and a good site may be selected. On shipboard, on the other hand, there is little choice; a place is found for the apparatus, and the coil is erected over this, usually without regard to the surroundings. It generally finds itself proximate to metallic structures of various kinds, lockers, rails, stays, cranes, and so forth. On shipboard are very unfavourable compared with those at land.

We may look upon the effects of the surroundings as warping or distortion of the wave front. Any change in the medium above the earth, or that of the earth, will have an effect on the wave front. It is well known, for example, that imperfect conductivity in the earth generates a rotating field of the electric force vector to have a radial component in the direction of propagation. This does not effect the compass under ordinary conditions; but any effect which causes the magnetic vector to be rotated component immediately causes trouble. This manifests itself in various ways; by causing the indicated direction of the source to be from the true direction, and in causing an imperfection of the wave from the true direction, and in causing an imperfection of the wave to the land, or encounters the metal ship, or in fact meets obstacles which cause a refraction, diffraction or reflection. We no longer have to deal with one wave, but with several. activated by the primary wave, plus a group of secondary waves. The primary wave may itself have been disturbed. The most general case is a rotating field in space. The indications of the magnetic field in this field is not too large it has no effect of a surface rotation. This reduces the problem to a circular vector in the field generated by the transmitter at O (in an wave this would be the only vector present); and let H' be component due to the scattering, refraction or whatever

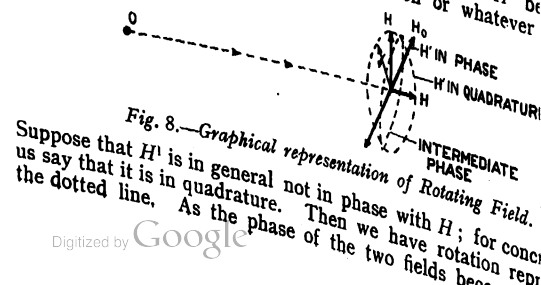


Fig. 8.—Graphical representation of Rotating Field.

* This is, incidentally, the wavelength set aside by the recent International Convention for radio compass work.

the transmitter to the coil is guided by this plane. Under these conditions, and provided also that the coil is sufficiently far removed from the transmitter that the field is substantially pure, the compass indicates the true direction of the transmitter. If the source were moved in a circle about the coil within sight, and the visual and radio bearings compared we would probably find perfect agreement between them. Conditions are seldom so ideal in practice. The nearest approach to a situation of this kind is a coil installed on a small wooden boat of the "submarine chaser" type and signals travelling across the sea water. Coils installed on these boats operate with very small error.

I shall discuss here two types of installation—those ashore (for navigational purposes), and those on board ship. The conditions encountered in each case are widely different; also there is, of course, considerable variation in both the ship and shore installations. On land there are no space restrictions and a good site may be selected. On shipboard, on the other hand, there is little choice; a place is found for the apparatus and operator and the coil is erected over this, usually without regard to its surroundings. It generally finds itself proximate to metallic structures of various kinds, lockers, rails, stays, cranes, and so forth. Conditions on shipboard are very unfavourable compared with those at land stations.

We may look upon the effects of the surroundings as due to a warping or distortion of the wave front. Any change in the conditions of either the medium above the earth, or that of the earth, will in general have an effect on the wave front. It is well known, for example, that imperfect conductivity in the earth generates a rotating field and causes the *electric* force vector to have a radial component in the direction of propagation. This does not effect the compass under ordinary conditions; but any effect which causes the *magnetic* vector to have a radial component immediately causes trouble. This manifests itself in two ways; by causing the indicated direction of the source to be different from the true direction, and in causing an imperfection of the minimum. When the wave is travelling over uneven ground, or passes from the sea to the land, or encounters the metal ship, or in fact meets with any obstacles which cause a refraction, diffraction or reflection of the wave we no longer have to deal with one wave, but with several. The coil is activated by the primary wave, plus a group of secondary disturbances. The primary wave may itself have been disturbed. The result in the most general case is a rotating field in space. If the vertical component of the magnetic field in this field is not too large it has no effect upon the indications of the coil. This reduces the problem to a consideration of a surface rotation. Let H in Fig. 8 represent the normal magnetic vector in the field generated by the transmitter at O (in an undistorted wave this would be the only vector present); and let H' be the radial component due to the scattering, refraction or whatever it may be.

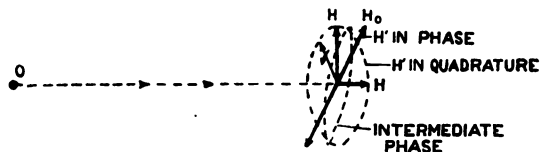


Fig. 8.—Graphical representation of Rotating Field.

Suppose that H' is in general not in phase with H ; for concreteness let us say that it is in quadrature. Then we have rotation represented by the dotted line. As the phase of the two fields becomes more nearly

equal, the ellipse contracts and its major axis changes direction until the point is reached at which they are in-phase and we have simply a non-rotational field represented by the vector H_0 . Now if the coil is orientated in a field of the rotating type in which the phase between H and H' is random, two effects will be discovered; the minima will have been shifted in azimuth and they will be imperfect. The in-phase part of H' causes the shift in azimuth and its quadrature component fills the minima with signal. The quadrature effect may be removed by means of the compensator, which generates a quadrature e.m.f. by antenna action that may be used to oppose the extraneous force.

The only thing of real importance then is the in-phase component of the secondary field. This causes a shift in the minima and so introduces an error in the directional determinations. The difference between the true direction and the observed direction due to these causes is termed the *deviation*.

CALIBRATION: In practice it is customary to determine the deviation experimentally by a process known as *calibration*. The method consists in having a source of radio signals (usually a ship of some kind) to circle about the compass station within visible range, and taking simultaneous visual and radio observations of the direction of this source. The visual observations are taken by means of a transit and are regarded as true bearings; the deviation is the difference between these and the radio bearings observed. The deviations are plotted as a function of the true azimuth (visual bearings); by plotting the observations and drawing the best curve through them. This curve is called the *deviation curve* and is of purely theoretical interest. Another curve in which the radio bearings are used as abscissæ instead of the visual, is derived from this curve and plotted with the sign of the variation reversed. This is called the *correction curve* and is used by the operator to correct the observations in routine work.

Since the accuracy of the bearings furnished by compass stations depends upon the calibration curve as well as upon the accuracy of observation, a great amount of effort has been spent in perfecting the methods of calibration. After considerable testing we have got to the point where this may be regarded as a fine art. The observational error is reduced by securing a strong signal; a 2 kw. source at a distance of from one to three miles has been found sufficient at shore stations. The points of extinction are then not over one-tenth degree in width. The dials are graduated to single degrees and in order to eliminate errors due to estimation of tenths, the dial is set on the even degree and the "mark" signal is given to the transit operator when the signal has become quite inaudible and is just beginning to increase. The transit man keeps the cross hairs upon the main mast of the ship at all times; this being a sufficiently conspicuous part of the vessel. When he receives the "mark" signal from the radio observer he simply stops adjustment and reads the angle. A third man records the data. Readings are taken every degree where it is possible. The vessel now retraverses the path in the opposite direction and another series of readings is taken. It is extremely important that the same path should be followed during the two transits over the working arc; otherwise the data is worthless. The necessity for a double run is this: The type of vessel usually employed in this work has an unsymmetrical antenna of the inverted "L" type. The flat top of this antenna makes an angle at the compass station of the order of one degree. Now when the vessel is so close to the coil, an appreciable radial component (in-phase) exists at the field-point

where the coil is situated. The result is that the coil does not point toward the lead-in of the antenna but to a point in front of it, that is, in a direction opposite to free end. This we may properly term the *centre of radiation*. A theoretical and experimental investigation of the dependence of the position of this centre upon the configuration of the antenna and upon the conductivity of the medium beneath it demonstrates that it lies on the vertical plane of the antenna, but in practical situations the actual displacement from the lead-in cannot be predetermined with any degree of accuracy. By reversing the direction of the ship, thus securing two curves, and taking the mean of these curves as the true calibration curve we can avoid the necessity for knowing where the centre of radiation of a particular antenna lies in relation to the part of the ship (usually the main mast) on which our transit sights are taken. Another advantage of this method is that errors arising from time lag between radio and visual observations and in having the radio observer wait until he is sure that the signal has reached a minimum and is increasing, are eliminated automatically. This seems to be the only satisfactory practical solution of the centre of radiation problem; the ship must be within a short distance of the compass station so that the transit observations may be reliably taken. In actual operation, of course, this is ignored because the angle of displacement is small compared with the natural errors at ordinary distances. With distances of the order of two or three miles, the displacement from the lead-in may attain to values of one-quarter to one-half degree; the error so introduced is quite intolerable.

LAND STATIONS : The environmental conditions at stations located on the coast line are more favourable than those aboard ship; consequently the deviations are smaller, and in general, more regular. The most serious effect encountered at these stations is a variation of the deviations from day to day, or even during the same day. This tendency is revealed by careful calibrations made on successive days under different and identical weather conditions, and also by a study of the operating "logs" of the stations. A complete explanation of this phenomenon has not been found, although it is known that the condition of the soil as affected by the weather has a definite, but by no means, exclusive, influence. Variations take place during periods of unchanged weather conditions. This is one of Nature's pranks and is rather difficult to combat. The only effective practical remedy seems to consist in having the operator observe, at certain intervals, the bearings on fixed transmitters and to make corrections accordingly. If these fixed points are well distributed over the operating sector (which is very seldom the case, the operating sector being for the most part over the sea) the method is good; if not, there is still some information to be obtained about the shifts that have taken place. It has been customary to plot the observed shifts over periods of a month; thus being able to detect any serious abnormalities in the station's performance. A typical record of this sort is shown in Fig. 9, which represents the variations at Cape May, N.J. This is not a particularly bad case; in fact this station is the best on the Eastern Coast of the United States. At some stations the excursions from the means may amount to three or four degrees. The amplitude of these variations obviously partially measures the reliability of the bearings furnished. The curves plotted in Fig. 9 are usually designated as *performance curves*.

The matter of selecting sites for land stations has received a great deal of attention and an extensive investigation has been made in an effort to formulate general methods for determining in advance whether conditions are suitable for compass operation. It is, of course, desirable

to have deviation amplitudes of small magnitude, but it is much more important to have a gradual and regular variation throughout the operating sector. In addition, it is most essential that the configuration producing

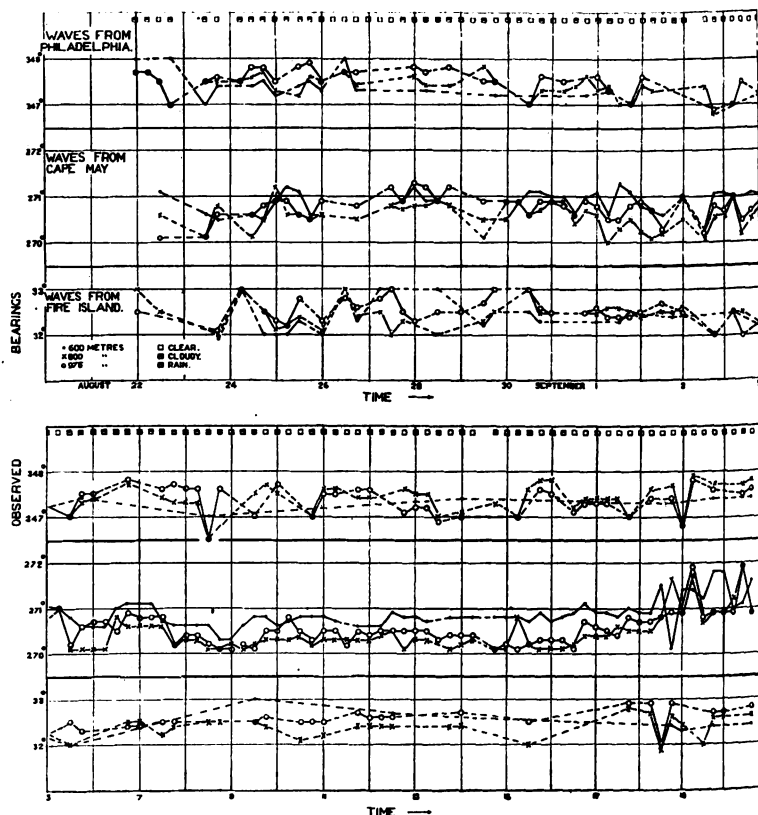


Fig. 9.

the deviations should be a fixed one, so that the calibration curves may not change during appreciable periods of time. At present these stations are calibrated at frequent periods of about a month or so, and any changes are detected at these times. It is, however, rather expensive and disconcerting to have this happen after the station has been installed, and by profiting by such experience and by the experimental investigations that have been made, the number of poorly located stations has been considerably reduced. Another matter of interest is the effect of refraction at the shore line. This depends upon the change in the character of the medium at the base of the wave when advancing over the sea it encounters the land. The theory for this has been worked out in detail, but no mention of it will be made here except the remark that refractive errors, depending as they do upon the conditions of the soil, are affected by weather conditions. It is desirable for this reason to locate the station as close to the water's edge as possible. The refraction is not serious, because the deviations

resulting are taken care of by the calibration, but its variation is also advantageous to avoid uneven terrain and, of course, all metallic structures; but if we can be sure that these structures remain unchanged it is possible to approach them quite closely in cases of pronounced necessity.

A typical calibration curve for a land station is shown in Fig. 10. It should be remarked that the deviations represented by the ordinates are not absolute values. It is quite a difficult matter to set the radio coil on the true north-south line; first, because the geometrical plane of the windings is not accurately at right angles to either of these planes; and second, even if this were the case, the setting could not be made unless the absolute value of the deviation was known on at least one azimuth. It might be possible to set the coil by taking observations on a perfectly symmetrical transmitting antenna erected a short distance away and assuming that the waves were undistorted during their progress. This, it should be noted, is a rather bold assumption to make. From a practical viewpoint it makes no difference what the absolute deviations are: all that is required is a correction curve from which true bearings may be derived. The excellent consistency of the observations in this particular curve is notable and reflects creditably upon the calibration technique.

The calibration curves of nearly one hundred land stations calibrated at frequent intervals and the information accruing from research work at other points furnishes a rich collection of data, the study of which has been most helpful in making proper selections of sites for radio compass stations. Whenever possible, the compensation variations as well as the deviations are recorded, and a complete theoretical analysis of the scattering of the radiation is possible.

SHIP STATIONS: After inspecting a typical naval ship installation an unsophisticated person is usually at a loss to understand how the device as a direction finder is used. The coil is generally surrounded by all sorts of metallic



Fig. 10.

resulting are taken care of by the calibration, but its variation is. It is also advantageous to avoid uneven terrain and, of course, all surrounding metallic structures; but if we can be sure that these structures remain unchanged it is possible to approach them quite closely in cases of pronounced necessity.

A typical calibration curve for a land station is shown in Fig. 10. It should be remarked that the deviations represented by the ordinates are not absolute values. It is quite a difficult matter to set the radio coil on the true north-south line; first, because the geometrical plane of the windings is not the electrical plane and the minima are not accurately at right angles to either of these planes; and second, even if this were the case, the setting could not be made unless the absolute value of the deviation was known on at least one azimuth. It might be possible to set the coil by taking observations on a perfectly symmetrical transmitting antenna erected a short distance away and assuming that the waves were undistorted during their progress. This, it should be noted, is a rather bold assumption to make. From a practical viewpoint it makes no difference what the absolute deviations are: all that is required is a correction curve from which true bearings may be derived. The excellent consistency of the observations in this particular curve is notable and reflects creditably upon the calibration technique.

The calibration curves of nearly one hundred land stations calibrated at frequent intervals and the information accruing from research work at other points furnishes a rich collection of data, the study of which has been most helpful in making proper selections of sites for radio compass stations. Whenever possible, the compensation variations as well as the deviations are recorded, and a complete theoretical analysis of the scattering of the radiation is possible.

SHIP STATIONS: After inspecting a typical naval ship installation an unsophisticated person is usually at a loss to understand how the device as a direction finder functions at all. The coil is generally surrounded by all sorts of metallic objects, stationary

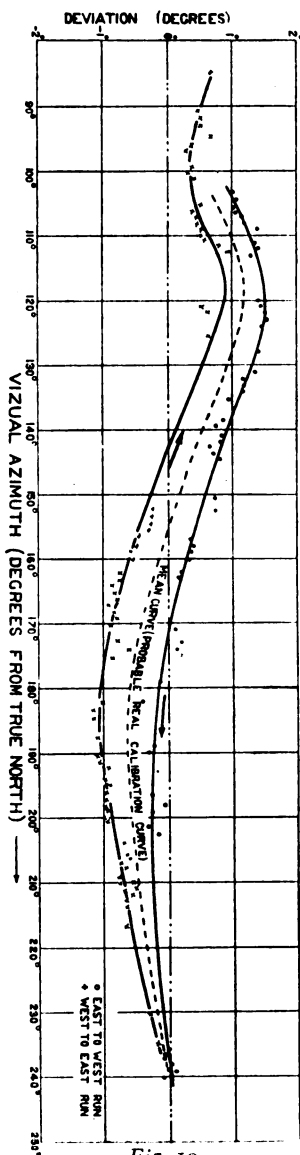


Fig. 10.

and movable, each of which in its own peculiar way seems capable of modifying the wave front. It is found, however, that the small objects give rise to no serious deviations if they are at a reasonable distance, say at a distance commensurable with their own dimensions. The predominant effect is that due to the scattering of the waves by the hull and superstructure. The masts, stays and radio antennæ have an important effect also, particularly at wavelengths near their fundamentals.

The hull gives rise to a scattering effect which manifests itself in a tendency for the wave to depart from its path and follow the centre-line of the hull. The deviations generated are of double periodicity, having maximum values off the four quarters, or at angles near 45, 135, 225 and 315 degrees. It is practically zero dead ahead and astern and may or may not be zero athwartships, depending upon the distance of the coil from the centre of the ship. I have examined this scattering theoretically, regarding the ship as an ellipsoid of revolution, and have found an excellent experimental agreement with these results in the case of ships with regular superstructure and at long wavelengths.

A typical ship calibration curve is depicted in Fig. 11. The effect of the hull is clearly discernible. The complete disappearance of the deviation at 90 and 270 degrees does not occur on account of both the disymmetrical situation of the coil and the influence of the main mast and associated stay structures.

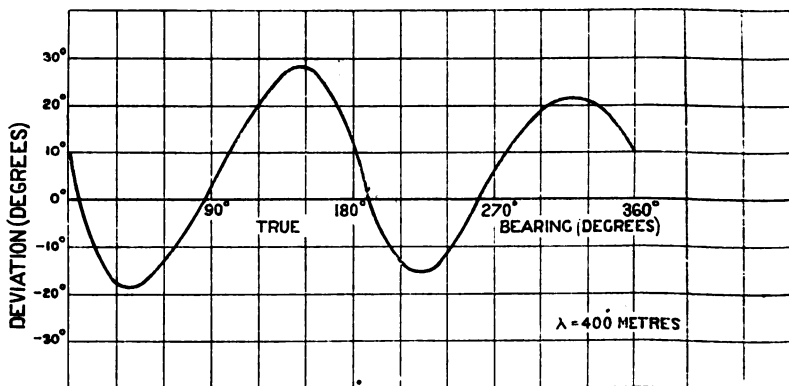


Fig. 11.

This curve represents a normal type of deviation which may be compensated artificially. A loop, somewhat larger than the coil may be so fixed that it will, depending upon the arrangement of its associated circuit, absorb or increase the coil energy on certain azimuths and thus restore the true reading. The adjustment is made (and it is only good at one wavelength) by swinging the ship until the signals arrive from off the quarter and then reducing the deviation to zero. The scheme is not practicable for general work over a band of wavelengths, and for that reason is not extensively used.

On shipboard the amplitude of the deviation generally increases with

* Since this was written my attention has been directed to an excellent theoretical treatment of this problem by Comm. Mezny (*Radio Review*, Vol. 1, 11 (1920), p. 532). Regarding the ship as an infinitely long right cylinder, Mezny arrives at very similar conclusions. Cf. J. J. Thompson, "Recent Researches in Electricity and Magnetism," pp 432, et. seq.

decreasing wavelength. The lowest wavelength upon which reliable operation may be attempted is determined by the fundamental wavelength of the main ship's antenna, *ungrounded*. This is nearly one-half its fundamental grounded, since it then acts very much like a Hertzian half-wave oscillator. It has not been found beneficial to load the antenna to a very high wavelength and ground it, in order to operate the compass at short wavelengths; the reason for this is obvious. If there is no antenna aboard the ship, the minimum wavelength may be reduced until the period of masts and stays is reached.

So long as the contour of the superstructure remains unaltered and the deviations evaluated one day may be used on the next we care very little whether their maximum amplitudes are 1° or 30° and there is little point in a painstaking investigation of the causes.

IV.—THE EFFECT OF THE DETECTOR CHARACTERISTIC UPON THE DEFINITION OF THE MINIMA.

In a preceding paragraph it has been shown that for small angular displacements the e.m.f. across the condenser varies directly with the angle from the true null point. Our sense impression, however, depends not upon this e.m.f., but upon the detected result of it; hence, the character of the minimum is determined by the *detector characteristic*. Let us define this characteristic by a general expression of the type.

$$R = \alpha e^n, \quad (7)$$

where R is the response, measured in any convenient way—by amplitudes of vibration of the telephone diaphragm, terminal voltage, current through the windings, audibility, etc.— e is the stimulus, identified in the discussion with the condenser voltage; α is the "detection coefficient"; and n is an index which is assumed to be constant over a small range of e about the null point. The relation between R and e defines the *stimulus-response characteristic* of the system.

Let us suppose that R is measured by the movement of the telephone diaphragm. The mechanism of audition appears to be amenable to the following description.

In Fig. 12 the sense impression derived from a sound stimulus is suggested graphically. As the stimulus is increased nothing happens at first, but soon a point is reached at which the sound becomes audible. This point may be called the *threshold stimulus*. Further stimulus increases the sense impression. Now if we let the stimulus be decreased it is found that the impression persists *below* the threshold point, the ear acting almost as if some inertia effect were present. The point at which the signal has died out completely may be termed the *minimal stimulus*. This explanation of the audition characteristic is purely empirical and, so far as I am aware, has no sound physiological or psychological foundation. It is, however, well in accord with experience and will serve our present purpose.

The operator, in excursing from one side of the minimum to the other, automatically corrects for this inertia effect. The mean position which he

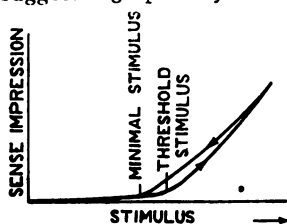


Fig. 12.—Illustrating Inertia in Audition.

selects as the most probable minimum is symmetrical with respect to each point. It makes little difference, then, which stimulus point we employ in the following discussion.

Let us suppose that Fig. 13 represents conditions in the region of the minimum. The abscissæ are angular displacements on either side of the minimum. This is a graph of the stimulus-response characteristic, and of (7). Let R_0 represent the diaphragm movement for threshold audibility and e_0 the corresponding stimulus. The zone of silence is $2e_0$ in breadth. The accuracy with which the points e_0 may be located depends apparently upon the rate of exchange, dR/de , close to this point. But the final accuracy is not determined entirely by this. It has been discovered, as a result

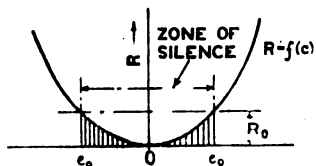


Fig. 13.—Characteristics at Minimum Point.

of a laboratory study of audition with a number of different observers, that the ability of the operator to locate the exact mid-point of the silent zone, falls off as the zone widens. This occurs almost hyperbolically at first, becoming rather less marked as the zone width increases. Operation is seldom attempted with large zones, so we may assume an inverse relationship here. The accuracy of observation may be defined then by combining these notions. Denoting this by M , it has the form:

$$M = \frac{\left(\frac{dR}{de}\right)e_0}{R_0} = n^a \sqrt{R_0^{n^2 a^2}}, \quad (8)$$

where R_0 is the threshold audibility; and n , a have their assigned meanings.

We may divide the possible signals into two types; undamped, or "arc" signals, and "spark" signals. All modulated wave types will be excluded from consideration on account of their decided unsuitability for these purposes. Two methods are customarily employed for the reception of "arc" signals—the heterodyne method and the autodyne method. Spark signals are received either in the ordinary way—that is, with straight detection (with or without an interposed radio frequency amplifier)—or by regeneration with a rough note.

In Fig. 14 are shown representative stimulus-response characteristics for the several methods of reception, with both types of signal. The "arc" response is nearly linear ($n=1$); the ordinary detection is closely a second order effect ($n=2$); and the index for the "rough note" regenerative reception has an intermediate value. From (8) we find that

$$M = \frac{a^2}{R_0} \quad \text{"arc" signals} \quad (9)$$

$$M_s = 2a \quad \text{"spark signals"}$$

If we legitimately broaden the meaning of a we observe that the accuracy increases in both cases with the signal strength (measured by e_0), its amplification previous to detection and the efficiency of detection. For spark signals the accuracy appears to be independent of the threshold stimulus (R_0). The derivative $\delta M / \delta n$ is zero for $n=2 \log a/R_0$ and an increase or decrease of the accuracy with n is determined by the ratio a/R_0 . By virtue of the natural amplification available by the heterodyne or autodyne methods of reception in the case of "arc" signals, and the rough note regenerative method in the case of spark signals, it is necessary to

reinforce the ordinary detection by several stages of pre-detection radio frequency amplification before the α becomes sufficiently large to permit comparison of the three systems. In practical apparatus I have found $2 \log \alpha/R_0$ to be much greater than the highest index n with which we have to deal, so that we make the deduction that the accuracy increases as the index of the system decreases. This implies, of course, an equality

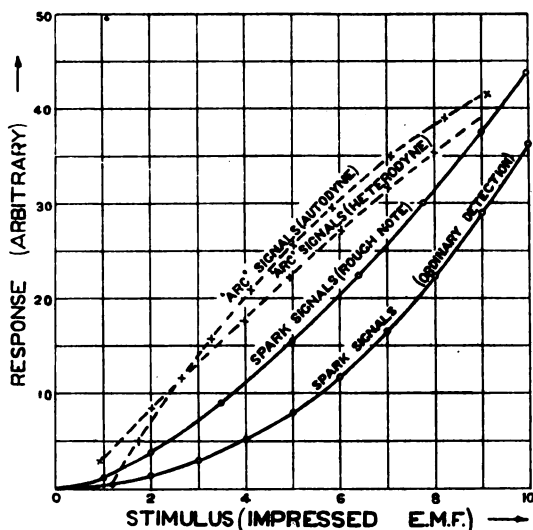


Fig. 14.

of ϵ_c in the three cases. Arranged in the order of merit then are the "arc," spark (rough note detection), and ordinary spark detection with high-frequency amplification. Arc signals are objectionable on other grounds. They are difficult to work with, to tune and to maintain a steady beat note during orientation of the coil and are more amenable to nocturnal variation than are the more heterogeneous spark signals. Rough note reception of spark signals, the next in order, does not recommend itself when interference is to be encountered. At isolated points where the direction finding traffic is light, this method is pre-eminently satisfactory. For general work under average conditions we find, that in spite of its inferiority from the above point of view, that the ordinary detection method with spark signals (preceded preferably by a maximum of radio frequency amplification) seems to be most suitable.

In conclusion I may remark that we have in brief, space succeeded only in scratching the surface on an immense and intensely interesting subject. Not only for its own sake is this research of value, but also because of the very nature of the investigations they constitute important contributions to the more general theory of electro-magnetic wave propagation over the surface of the earth. I have endeavoured in presenting a tolerably comprehensive outline of radio compass operation in both its practical and theoretical aspects, however discursively and cavalierly, to avoid those extravagant remarks that an enthusiast is so likely to make, and to adhere as far as is consistent with the demands of sufficiency and cursive exposition, strictly to a policy of mentioning only those developments that I have been permitted to make.

HISTORICAL LANDMARKS IN WIRELESS INVENTION

BY PROFESSOR G. W. O. HOWE, D.Sc.

ONE could probably adopt no course more likely to lead him into trouble than to attempt to allocate merit between the various members of that great army of scientific workers who, as the result of their collective activities, have developed the art of radiotelegraphy from its earliest beginnings to its present condition, and yet, when the writer was asked to contribute an article to the *Year-Book*, dealing with the development of Radiotelegraphy from the point of view of those inventions which have proved to be of most importance in that development, he consented to do so because he felt that such an article should be of great interest to everyone connected with the subject, and more especially to the many younger men who find it difficult to picture a world unprovided with thermionic valves. Looking back ten or twenty years it is a far easier matter to judge an invention as regards its importance in the development of the subject than as regards the merit due to the inventor, because to do the latter it is necessary to clear one's mind of all subsequent knowledge and put oneself in the position of the scientific worker of that date. In the present article an invention is regarded from the point of view of its ultimate importance in the line of development, rather than of the merit of the invention in itself.

The fundamental invention of radiotelegraphy was made by Hertz in 1887. Helmholtz had suggested to him, as a subject of research, the experimental confirmation of Maxwell's theory of the displacement currents in dielectrics, and he had devoted much time in a vain endeavour to establish an experimental proof. He was engaged in other experiments when he noticed certain things which many scientists would have passed over but which he was quick to recognise as an important step along the road which he had trod so patiently; he was thus led to make his classical experiments on the production and detection of electromagnetic waves. These experiments are almost unique in the novelty of their inception, and in the systematic confirmation of theoretical hypotheses. They are also unique in their rapid development to a branch of electrical engineering which has revolutionised the intercommunication between the peoples of the world.

The two names which stand out in immediate succession to Hertz are those of Lodge and Marconi. Sir Oliver Lodge had already made many experiments with electrical oscillations and was able to appreciate fully the scientific import of Hertz's work. Marconi had the imagination to see, if only very hazily, something of the possibilities of this new discovery; he also had the initiative and the power of application to put his ideas to the practical test and, whether fortune smiled or frowned, to persevere in the accomplishment of his purpose. His patent, No. 12039 of 1896, is in the main an application of a Hertzian radiator of large size and a similar receiver with a filings coherer as the detecting device. It is interesting to note that after describing a horizontal radiator of the type used by Hertz, except that the metal plates were of large size and supported on poles, the

inventor says that where obstacles such as many houses or a hill or mountains intervene, "I have devised and adopt the arrangements shown in Figs. 10 and 11—i.e., a vertical radiator with one terminal of the wire joined to an elevated capacity area and the other terminal earthed. It is not very obvious why this superior arrangement was not to be used in all cases. Lodge's patent, No. 11575 of 1897, shows a remarkably clear insight into the problem of tuning and selectivity. It constitutes a great advance on Marconi's patent of the previous year in its clear statement of the scientific principles involved and the *modus operandi* of the production and reception of the electromagnetic waves. It describes the insertion of an aerial tuning inductance, not only for the purpose of tuning the two stations to the same frequency, but also for the purpose of reducing the decrement and thus causing the wave trains to be prolonged so as to make sharp tuning possible and thus receive the desired signals without interference. The advantages of a vertical radiator, either with an insulated counter capacity or with an earth connection, are clearly stated to consist in reduced absorption and uniform horizontal radiation.

In describing the steel point coherer a remark is made which was many years in bearing fruit, viz., "When a telephone is used I find that the coherer restores itself sufficiently without specially arranged tremor (decoherer) and that a telephone is the quickest responder that can be used." Apparently, however, it was considered essential, at that time, that the message should be recorded by some type of ink and some years elapsed before telephone reception became general.

In 1897, then, we had the vertical aerial which Marconi had shown should be high and provided with upper capacity, and which Lodge had shown should be tuned and given as small a decrement as possible. Whether it should be earthed or provided with a counter-capacity we now know to have been a relatively secondary matter in the stations then in use.

The next great step was the invention of the tuned coupled aerial which was described in the celebrated patent No. 7777 of 1900. The provision of a path between the aerial and earth other than that through the spark gap was not new. Braun, in patent No. 1862 of 1899, had placed the gap in a primary circuit coupled to the aerial but had not apparently realised the great advantage of loosely coupling the two circuits and tuning them to the same frequency. Tesla had used somewhat similar arrangements many years before but not in connection with wireless telegraphy. The tuning of the four circuits, viz., the spark-gap circuit, the transmitting aerial, the receiving aerial and the detector circuit, is clearly described and discussed in the Marconi patent, from which we quote the following: "The circuit of the elevated conductor should be suitably attuned for this purpose. The four circuits, viz., those including the primary and secondary of the transformer in the transmitter, and the primary and the secondary of the transformer in the receiver should be so adjusted as to make the electric time period the same in each. But in lieu of the time periods being the same they may be harmonics of each other." This represented a great advance as is sufficiently evidenced by the litigation and claims for priority which have centred around this patent. Most German writers have persisted in calling the plain aerial with the spark-gap between it and the earth a "Marconi" aerial, to emphasise their claim of the coupled aerial for Professor Braun.

Not only in his classical researches with the Tesla coil may Tesla claim to have paved the way for advances in wireless telegraphy. An invention of great practical importance for the development of the subject was made about the same time as the earliest experiments of Marconi. We refer to the invention by Tesla of the synchronous discharger as described in his patent specification No. 20981 of 1896. This is of great interest on account of the clear description at that early date of the process of tuning and of the adjustment of the phase of the discharge by moving the stationary electrodes of the gap. His claims cover the use of a rotating discharger with either a continuous or an alternating source. In the D.C. case he describes the tuning to synchronism with the natural frequency of the charging circuit and the adjustment of the output by controlling this natural frequency or the speed of the discharger. In the A.C. case he describes the adjustment of the position of the fixed terminals of the spark-gap in order to cause the spark to occur at the correct phase moment. In the case of a D.C. supply he says: "A very slight variation in this respect by disturbing the relations between the rate of impressed impulses and the vibration of the circuit of high self-induction into which they are directed, caused a marked departure from the condition of resonance and a corresponding reduction in the amount of energy delivered by the impressed impulses to the apparatus." Naturally, he does not mention radiotelegraphy, but he says that his apparatus is "for converting electric currents of the kind generally obtainable from municipal systems of electrical distribution into currents of high frequency." As a further indication of Tesla's insight into the processes involved we quote the following: "In order to charge alternately a given circuit of this character by periodic impulses impressed upon it and to discharge it most effectively, the frequency of the impressed impulses should bear a definite relation to the frequency of vibration possessed by the current itself. . . . When the conditions are such that the general law of harmonic vibrations is followed, the circuits are said to be in resonance or in electromagnetic synchronism and this condition of the system is found to be highly advantageous." Here one has, in 1896, the synchronous discharger with adjustable electrodes and instructions for tuning the low-frequency circuit to resonance with the discharger, all ready to be incorporated without any alteration in the transmitting system of a wireless telegraph station.

It was some years, however, before the power employed in wireless telegraphy, and the spark frequency were increased to such values that one gave up the fixed gap and adopted the invention of Tesla. It is interesting to note that in the first edition of Professor Fleming's *Principles of Wave Telegraphy*, published in 1906, the synchronous discharger is not considered, but a fixed gap shown even for the highest powers then in use. When once adopted, however, it very quickly became the standard type of gap, except in systems employing the quenched spark. An important link in the chain of development was the abandonment of the coherer and inker in favour of telephonic reception. The loss of the printed record was far more than compensated for by the power of discriminating between the signals and extraneous disturbances from other stations and from atmospheric effects. It emphasised the importance of tuning, of correct coupling and of uniformity of sparking at a high acoustic frequency, in order

to obtain a musical tone clearly distinguishable from atmospheric disturbances.

Although the use of a telephone receiver in conjunction with a carbon detector had been known since 1896, and although Neugschwender had invented his electrolytic detector in 1898, it was not until 1903 that the coherer and inker were definitely replaced by telephonic reception. The Marconi Company adopted the magnetic detector in the beautifully simple form which they had patented in 1902. One must remember, however, that a type of magnetic detector had been devised and used by Rutherford in 1895 to detect the radiation from a Hertz radiator at a distance of half a mile across Cambridge. Subsequent research had been carried out by Wilson and others. One cannot conceive a simpler form of detector or one requiring less adjustment and maintenance than the Marconi magnetic detector. It was for many years the only detector carried on the majority of British ships. It was not highly sensitive, but in reliability it left nothing to be desired.

The Telefunken Company gave up the coherer and inker at about the same time and adopted the electrolytic detector in the form designed for them by Schlömilch. Here, again, many scientists had investigated electrolytic detectors of various types, and it is a matter of great difficulty to say to whom the credit is mainly due. General Ferrié had experimented before 1900 with a type very similar to that ultimately adopted by the Telefunken Company and many others.

Other types of detectors followed. It had been known that certain crystals possessed unilateral conductivity, that is, they offered a lower resistance to current in one direction than to current in the reverse direction. They could, therefore, be employed as rectifiers of the high-frequency currents in the receiving circuits if they still possessed this property at these high frequencies, which was found to be the case. Three names stand out with special prominence in the invention of detectors of this class. Pickard's patent, No. 836531 (U.S.A.) of 1906, is for a detector of silicon and copper, Dunwoody's, No. 837616 (U.S.A.), of 1906, is for a non-metallic crystal, viz., carborundum. During the years 1906 and 1907 Pickard and Pierce took out a number of patents as they found one thing after another capable of being employed as a detector. In most of these it was found preferable not to employ the simple rectifying property by virtue of which the current in one direction experienced a greater resistance than that in the other, but to make use of the fact that, as the current in one direction was varied in magnitude, the contact did not obey Ohm's law, or, in other words, the characteristic was curved. The increased sensitiveness was usually sufficient to compensate for the necessity of using a cell and potential divider. For long distance work the crystal detector in some form or other largely replaced the magnetic and the electrolytic detectors, and although most crystal detectors required very careful adjustment at frequent intervals and were put out of action by a heavy atmospheric, it was possible with others, especially with carborundum, to obtain great reliability with a fair degree of sensitiveness.

Another invention which preceded that of the crystal detector was the Fleming valve. Although the rectifying property of this valve had been known for many years and had been investigated by a number

of scientists, especially by Prof. Fleming himself, the suggestion that it could be used as a detector in wireless telegraphy was first made by Fleming in his patent No. 24850 of 1904. Although in the patent the inventor describes its use as a simple rectifier; that is, by virtue of its ability to pass current in one direction and not in the other, it was usually employed in practice in the other manner mentioned above in connection with crystal detectors, that is, with a steady current flowing through it of such a magnitude that it was at a point of sharp curvature on the characteristic. Although possessing reliability and fair sensitiveness, it did not displace the magnetic detector nor the crystal detector, except in special cases. Its great service to the art of wireless telegraphy was in acting as a forerunner to the three-electrode valve.

It will thus be seen that the period 1902-1906 saw the invention of a number of detectors of different types. Although during this time little progress appears to have been made in methods of generating the electromagnetic waves with the aid of spark gaps, a method was invented of producing undamped or continuous waves. It was in 1900 that Duddell discovered that the electric arc was capable of generating alternating currents; he used ordinary carbon electrodes in air and found that the frequency of the currents could not be raised above the audible range. Poulsen's modifications which transformed the Duddell arc into an efficient apparatus for the production of undamped alternating currents of radiotelegraphic frequencies were embodied in his patent No. 15599 of 1903. It was in 1906 that Poulsen demonstrated his arc in operation at the Queen's Hall in London to a large assembly of scientists and interested persons. The chairman at that gathering with an optimism, real or assumed, which events certainly did little to justify, informed the meeting that they had met that day to sound the death knell of the spark. The arc made it possible to obtain tuning of a sharpness far beyond anything obtainable with spark-gap circuits, but such sharp tuning called for a constancy of frequency which was difficult to obtain with the arc as then made. Ten years had to pass, and Poulsen's patent near its expiration, before the arc was adopted to any considerable extent as a generator in radiotelegraphy. Its ultimate adoption was due partly to the successful operation obtained with relatively large powers, but to a greater extent to the development of new methods of reception specially applicable to continuous waves. It is worthy of note that the arc generators being constructed at the present time for 500 and 1,000 kilowatts contain no essential modification from Poulsen's original invention. They differ merely in size and in constructional detail. In the water-cooled anode, the hydrocarbon atmosphere and the transverse magnetic field Poulsen had combined all the modifications essential to successful operation.

As we have said, with the exception of the Poulsen arc, the period 1902-1906 was mainly conspicuous by the development of means of reception; the next few years, however, saw a transformation in the methods of generating the high-frequency currents. Up to this time the spark-gap had had fixed electrodes separated by a considerable distance, sometimes enclosed in gas or compressed air, but more often open and subjected, in some cases, to an air blast. In 1908 von Lepel introduced a new form of spark-gap consisting of two metal plates separated by a sheet of paper with a hole in it. This was generally supplied from a continuous current source, the spark frequency being

dependent on the constants of the electric circuits. This system was described in patent No. 17349 of 1908 and was installed at Slough where it was seen in operation by many wireless engineers. For the first time wireless operators heard clear high-pitched musical notes in their receivers and were at times given the National Anthem and other airs played on a keyboard at Slough, by means of which the circuits were adjusted to give a regular scale of spark frequencies.

The Telefunken Company, after investigating the Lepel system, took out patent No. 6424 of 1909 for their well-known quenched spark-gap consisting of copper discs preferably faced with silver, with a very small separation between the parallel faces of adjacent discs; the number in series depended on the power of the station. Instead of paper, which in the Lepel gap was slowly burnt away, the Telefunken Company used rings of mica which served both to insulate and to maintain the spacing and also to enclose the sparking space, but which were separated from the actual spark by a groove in the face of the electrode. The quenching action of short gaps and its relation to the coupling was first studied and clearly explained in 1906 by Max Wien, using an ordinary open gap between spherical electrodes, but it was only by using a gap of the Lepel type that the principle was embodied in a practicable spark-gap. The quenched gap has been adopted by many companies, and when properly designed and employed in a suitable circuit, gives a musical note of a uniform and pure tone; it has the advantages of being noiseless at the transmitting station and allowing the high-frequency circuit to be arranged quite independently of the position of the running machinery.

At the same period that the quenched gap was being developed and introduced by the Telefunken Company, other companies generally adopted the synchronous gap originally devised by Tesla, the object being to obtain uniformity of sparking with a large number of sparks per second. The appreciation of the benefit of using a high spark frequency is indicated by a peculiar patent, No. 13865 of 1908, granted to Fessenden for the use of a spark frequency exceeding 250 and especially for one of about 1,000 per second.

No striking developments occurred during the period 1908-1914. There was a gradual increase in the wavelengths employed for long distance transmission and also in the power which was considered necessary to maintain such communication. Quenched gaps and rotating synchronous gaps were designed to deal with these large powers. The Poulsen arc made a little progress on the Pacific Coast of the United States. Since 1914, however, the whole art of wireless telegraphy and telephony has undergone a transformation, due not so much to new inventions made during this period as to the discovery of the wonderful possibilities which lay dormant in an invention made several years before. No single invention has done more to revolutionise radiotelegraphy than that of the audion. Little did Dr. de Forest imagine, when he placed a control electrode first on the outside of the bulb of a Fleming valve and then inside the bulb as a grid between the anode and cathode, that he was making the most important step in the whole history of radiotelegraphy, but that such was the case no one can now have the slightest doubt. The first suggestion of a three-electrode valve is made by de Forest in a paper read before the American Institute of Electrical Engineers in 1906, where he says: "It is not necessary to connect the anode to a terminal of the oscillating

circuit; one terminal may be attached to a metal sheath or ring surrounding the glass vessel. . . . This latter type of audion is the one I have found most serviceable in practice." In a patent taken out later in 1906 he places the control electrode inside the bulb, but as a plate behind the filament. On the 29th January, 1907, Dr. de Forest applied for a patent for the grid placed between the filament and the anode and thus gave the audion the form in which we now know it. In the same patent is shown the method of receiving by inserting a condenser in the grid lead, now so commonly employed. Development proceeded slowly from 1907 to 1912; the behaviour of the audion was uncertain because of the poorness of the vacuum and it was questionable whether any advantage it had as a detector over the much simpler crystal was sufficient to outweigh its cost, uncertain life, auxiliary batteries and resistances. It is a strange and noteworthy fact that the British patent was allowed to lapse.

Although slowly, progress was being made both in the United States where de Forest developed the use of his three-electrode valve as an amplifier, and in Germany where von Lieben and Reisz were working along the same lines with a valve of very different construction. The use of a three-electrode valve as an amplifier may almost be said to be older than the three-electrode valve itself. In his German patent, No. 179807 of March, 1906, von Lieben claims the invention of "A cathode ray relay for oscillating currents up to the highest frequencies, in which slow cathode rays emitted in the known manner by a concave cathode coated with glowing metal oxide, are so controlled by the oscillating current to be amplified that they produce in their circuit oscillations of the same frequency but of greater amplitude." Lee de Forest's invention of the three-electrode valve provided at once a means for carrying out this amplification in a practical and simple manner. The development of the valve owes much to the work of Longmuir on the production of high vacua; with the practical elimination of the remanent gases and improved methods of construction, the audion became a reliable piece of apparatus which could be manufactured with the same degree of certainty as to its characteristics as an electric lamp.

There are apparently several claimants to the invention of the three-electrode valve as a generator of oscillations. During the years following 1907, in the course of experiments on the use of the valve in various circuits, cases would undoubtedly arise in which oscillations might occur and probably did occur, much to the disgust of those desirous of developing a reliable amplifier, but to Meissner is apparently due the credit of first introducing a magnetic back coupling from the anode to the grid circuit for the express purpose of maintaining oscillations. This experiment was made in 1913 and is described in British patent, No. 252, applied for in January, 1914. The idea of adjusting the back coupling so that the oscillations are almost maintained and thus decreasing the effective damping of the receiving circuit is due to Franklin who clearly describes this in his patent, No. 13636 of June, 1913, although we now know that there is always a certain amount of coupling between the two circuits owing to the internal capacities of the valve itself. Dr. de Forest was early in the field with an oscillating valve set connected up in a way which he had found to give great sensitiveness in detection and to which he had given the name *ultraudion*. It is noteworthy that in a paper on the heterodyne method of reception,

read before the Institute of Radio Engineers in 1913, there is no mention of the possibility of using a three-electrode valve as a generator, although in another paper at about the same time de Forest mentions the precautions necessary to prevent a two or three valve amplifier from singing.

The invention of the heterodyne method is due to Fessenden, who first suggested sending out too slightly different wavelengths from two transmitting aërials; he then, at a later date, introduced the locally generated current of a frequency differing slightly from that of the received current, but proposed to utilise the beats to act directly on various forms of electromagnetic and electrostatic telephone receivers, without any detector in the usual sense. The difficulties of heterodyne reception due to the want of a suitable local generator were such that continuous wave signals were received by the "tikker" until 1914, except for a few isolated experiments in which a small arc was employed.

The three-electrode valve has not only given us a new method of generating high-frequency currents for the production of electromagnetic waves at the transmitting station but has also led to a great development of all other methods of producing high-frequency current. For the production of continuous waves there were several methods available, but in all cases development was hindered by the difficulties experienced in impressing an acoustic frequency upon the continuous waves or upon the received signal which was otherwise inaudible. The advantages of the heterodyne method of reception were realised but could not be conveniently realised because of the lack of any thoroughly reliable and simple source of high-frequency current to superimpose locally upon the receiving signals. The three-electrode valve revolutionised the reception of continuous waves and consequently gave an impetus to methods of producing them. The Duddell-Poulsen arc has been built in ever increasing sizes without, however, any modification except in details of construction. The direct production of high-frequency current by means of an alternator of the appropriate frequency must appeal to the electrical engineer as, in many ways, the ideal solution of the problem. The difficulties, however, are very great, and various ingenious methods have been invented for overcoming them. Goldschmidt's invention in 1911 created great interest, but only two or three stations have been equipped with this system. Any single-phase alternator induces in its field circuit an alternating current of double the frequency of the armature current, and this double frequency current superposed upon the continuous field current causes a third harmonic current to be induced in the armature which induces a fourth harmonic current in the field circuit. These harmonic currents are usually negligible, but Goldschmidt, by turning the various circuits to the appropriate frequencies by means of condensers and inductances, caused these currents to build up to an extent limited only by unavoidable losses and thus supplied to the aerial a current of 40,000 cycles per second from an alternator of 10,000 cycles per second.

Another method for obtaining the same result in an entirely different way consists in utilising the distortion produced in the magnetising current of a transformer owing to the saturation of the iron. This was not originally invented for the purpose of radiotelegraphy or even of high-frequency currents, and many names are associated with the

discovery and development of various methods of utilising the phenomenon of saturation for the multiplication of frequency, notably, Clinker, Epstein, Joly and Vallauri. The development of the system for high-powered wireless transmitting stations is due to the Telefunken Company, who have equipped several stations on this system, notably their large station at Nauen.

The development of alternators capable of generating efficiently several hundred kilowatts at a frequency of 30,000 cycles per second is a matter of great mechanical and electrical difficulty, but these difficulties are greatly reduced if the wavelength is increased to say 30,000 metres and the frequency, therefore, reduced to 10,000 cycles per second. The design of large machines, capable of generating current at frequencies between 20,000 and 30,000 and suitable, therefore, for supplying the aerial without the intervention of any frequency multiplying device, has been developed both in America and in France, but without producing any invention of striking novelty or importance, although great ingenuity has been shown in overcoming the mechanical difficulties.

Directive telegraphy may be subdivided into the transmission of waves predominantly in certain directions and the determination at the receiving station of the directions of the arriving wave. The earliest invention in directive transmitting was that of S. G. Brown, in 1899, who described, in patent No. 14449, the effect of having two aerials supplied with currents of suitable phase difference. The only important modification of this principle is the bent aerial of Marconi, the action of which is of a very complex nature. Directive reception by using S. G. Brown's double aerial would necessitate rotating the aerials to receive stations in various directions; this was obviated by the invention, in 1907, of the radio-goniometer by Bellini and Tosi. The use of a small rotatable coil may be said to have originated with Hertz, who used a closed coil as a receiving circuit and showed that its response depended on its orientation. In its modern form Pickard employed the direction finding coil with tuning condenser and detector in 1907. Modern development has been due almost entirely to the increased sensitiveness obtainable with three-electrode valve amplifiers and detectors.

In wireless telephony, invention has been devoted to two distinct problems, namely, the production of a pure undamped wave, and the modulation of the radiated power. The former is now common to telephony and telegraphy. The earliest experiments were made with sparks following one another at a frequency above the acoustic range; experiments were also made with high-frequency alternators, but the major part of pre-war radiotelephony was done with the Poulsen arc. The advent of the valve oscillation generator has revolutionised the whole problem and it will undoubtedly lead to great developments. In the second field of research great ingenuity was devoted to the design of a microphone capable of controlling directly the large powers required. The only outstanding inventions were the liquid microphones of Majorana and Vanni. These, like so many things, have been rendered obsolete by the thermionic valve, which not only produces the oscillations but which immediately suggests the application of its amplifying properties to the modulation of the output of the generating valve. Another ingenious device is that of using the microphone current to vary the permeability of the core of a coil, either directly or

through a thermionic amplifier; the variations of permeability cause variations of inductance and thus affect the tuning of the circuit containing the coil, which circuit may be the radiating antenna. This application is due to Alexanderson, who described his magnetic amplifier in 1916. If the antenna is supplied through a frequency doubling transformer the permeability control can be introduced in the transformer, thus modifying the double-frequency output. This method is due to Kühn, of the Telefunken Company, and has been used in 1913 in telephony experiments between Berlin and Vienna.

In concluding this review we realise that a vast amount of research, discovery and invention has been passed over without mention. We can only pretend to have reviewed those outstanding discoveries, which to one looking backwards, seem to stand out as essential links in the chain of progress which has led from the experiments of Hertz to the present state of the art.

VALVE AMPLIFIERS FOR SHIPBOARD USE

BY F. P. SWANN.

IN the *Year-Book* for 1920, the factors which governed the design of the three-valve amplifier for shipboard use were discussed at some length. At that time the four-electrode valve and its circuits were only in the embryo state, but amplifier requirements were so immediate that one had to be designed at once from the knowledge then available. It was recognised, however, that this design would only be a temporary measure, for the maintenance of the resulting three valves with their attendant heavy filament current would of necessity prove to be a heavy item. Work, therefore, was commenced with a view to the production of a valve which would be much more robust than the existing forms of receiving valves, have a longer life, and the use of only one of which would give the same results as those obtained by the three valves in the Type 71. The present four-electrode valve and its accompanying circuits was the final result, and the amplifier which we are about to describe was designed along

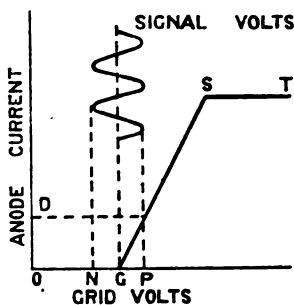


Fig. 1.

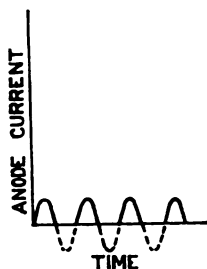


Fig. 1a.

similar lines to those of the Type 71. In order to gain a clear appreciation of the manner in which it is functioning, it will perhaps be best to start with the simplest circuit of the three-electrode valve, and follow the development from that. Before doing this, however, an explanation will first be given of the manner in which a valve acts as a rectifier.

In Fig. 1 OGST represents an imaginary characteristic curve of a three-electrode valve (anode current plotted against grid volts). Such a curve would be an ideal one from a rectifying point of view, and we will assume that we have such a curve at our command, as this will simplify the explanation a little. Fig. 2 shows a tuned aerial circuit coupled to a tuned closed circuit, and from the aerial current induced by the signal, oscillating currents are produced in the closed circuit. Across "AB," therefore, we have a sine wave alternating E.M.F., which is represented by the sine curve in Fig. 1. As shown in Fig. 2, "A" and "B" are connected to the grid and filament (*via*

the potentiometer) of the valve. The potentiometer is adjusted until the grid is "OG" volts positive, for any increase in grid volts above this value causes the anode current to commence very abruptly. Now it will be seen that the positive half of the wave, or signal curve,

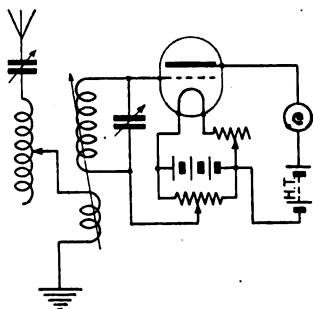


Fig. 2.

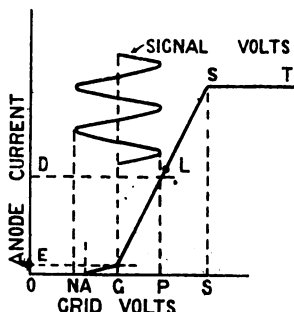


Fig. 3.

will take the grid volts up to "OP," and the negative half will reduce them to "ON." The increase "GP" of grid potential will cause an anode current of value "OD" to flow, but the decrease "NG" produces no change at all in the anode current, therefore the whole of the positive half of the curve will be utilised in producing an unidirectional pulsating current in the anode circuit, having a maximum value "OD." This is shown in Fig. 1a.

Now let us assume that the rate of increase of anode current with increase of grid volts is as shown in Fig. 3. In this case the increase in grid volts "OA" produces no anode current, but from "A" to "G" the anode current rises at a certain rate, and from "G" to "S" rises at a very much greater rate. Now by means of the potentiometer let us set the grid potential to "OG," and, as in Fig. 1, let the sine curve represent the signal volts. The positive half of the curve takes the grid volts to "OP," and causes an increase "ED" in the anode current.

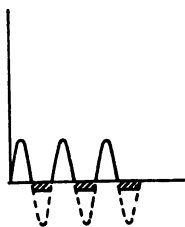


Fig. 3a.

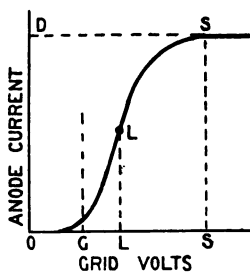


Fig. 4.

The negative half of the curve reduces the grid potential to "ON," and causes a decrease "EO" in anode current. The resulting anode current is shown in Fig. 3a. In Fig. 1a the effect in the telephones would be the summation of the pulses over the length of a wavetrain,

and it is the same in the case of Fig. 3a, but here the shaded portion of the curve below the line is negative, and therefore must be subtracted from the top or positive half of the curve. The final result, therefore, over the same length of wavetrain will be very much less. The characteristic curve, therefore, of Fig. 3 is not so efficient as that of Fig. 1. From the preceding it will be seen that if the grid volts be set to a value "OL," and the changes produced by a signal lie within the limits "OG" and "OS," then the positive and negative halves of the curve will be equal, and their addition zero, consequently nothing will be heard in the telephones.

Similarly, if a wavetrain be sufficiently damped, a constant high resistance will act as a rectifier, for the areas of the positive and negative halves of the wavetrain are unequal.

In Fig. 4 is shown the characteristic curve of a valve as obtained in practice (anode current plotted against grid volts). From this it will be seen that any increase in grid volts above the value "OS" produces no further change in the anode current. This point is often referred to as the "saturation" point. Rectification can usually be obtained at both top and bottom bends of the curve, but as the change of curvature at the lower bend is, in most valves, greater than that of the upper bend, it is the lower bend which is generally used for rectification purposes. For the most efficient rectification, the grid potential would be set to "OG," and the conditions would then approximate to those shown in Fig. 3.

The law for a rectifying curve such as that shown in Fig. 4 is that the strength signals in the telephones is proportional to the square of the strength of the incoming signals.

If the anode volts are increased, and the filament current kept constant, the curve slides bodily to the left without any change in shape, but if the anode volts are kept constant, and the filament current is varied, the curve stays in the same position, but the saturation point

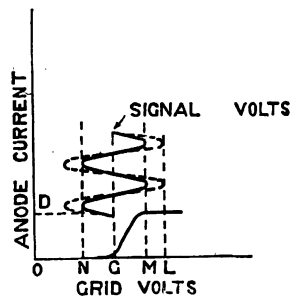


Fig. 5.

"S" moves up and down, and, as may be expected, when the filament is very dull, is arrived at for a small value of anode current. This property of the valve is a very valuable one, and a little further study will show how, by its use, a jamming station may be eliminated. In Fig. 5 the characteristic curve of a valve is shown with the filament dulled down. The grid potential is set at "OG," and the sine curve represents the incoming signals. The positive half of the curve takes

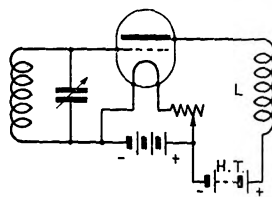


Fig. 6.

Valve Amplifiers for Shipboard Use

the grid volts to "OM," and consequently the anode current which is its limiting value. If now a much stronger (dotted) comes in at the same time and on the same frequency, although the grid volts are now taken to "OL," there is an increase in the anode current, so that signal voltage "GL" will produce the same strength of signal in the telephones. Such an adjustment would prove a big advantage, as jamming station is reduced to the same strength as the desired signal, then readability is much improved. The matter will be taken a step further.

Reference to Fig. 4 will show, as has already been pointed out, that the change in curvature of the top bend of the curve is not so great as that of the lower bend. For nearly all signals, the straight part of the curve can be found where the curvature of the anode curve are equal, and therefore balance out. However, of different damping and different strengths of signals, the difference in curvature of the upper and lower bends will not all coincide, but will have different curvatures along the straight part of the curve. It is, therefore, possible to read the station one wishes to hear. In view of the fact that the rectification is inefficient, and signals are reduced, an adjustment gives a large area to the negative part of the curve. The reason that magnification after rectification becomes necessary to bring signals up to strength again. Having regard to the law of the rectifier, it will be conceded that the only effective method of increasing the sensitiveness of the rectifier is to magnify the high-frequency current before rectification. It has been explained that the adjustment for the going of jamming necessitates a low-frequency magnification, so the requirements which the amplifier has got to follow are:—

- (1) Magnify before rectification.
- (2) Rectify.
- (3) Magnify after rectification.

HIGH-FREQUENCY MAGNIFICATION.

In Fig. 6 is shown the simplest circuit of the three-electrode valve, and, save for the introduction of the inductance "L" in the anode circuit, is the same as that in Fig. 2. In the case of frequency magnification, the curve of the resulting anode current should be exactly the same shape as the curve of the incoming signal. Such a condition only obtains when the characteristic of the valve is straight over quite wide limits. For most telephony, it does not matter if there is a certain amount of curvature. If the grid potential is adjusted to a value "OG," the current in the anode circuit, which now contains the inductance "L," will be much greater than the current induced by the incoming signal, and will have the same shaped curve and be of the same strength. An arrangement constitutes a one-stage magnifier.

the grid volts to "OM," and consequently the anode current to "OD," which is its limiting value. If now a much stronger signal (shown dotted) comes in at the same time and on the same wavelength, although the grid volts are now taken to "OL," there is no corresponding increase in the anode current, so that signal volts "GM" and "GL" will produce the same strength of signal in the telephones. Such an adjustment would prove a big advantage, because if the jamming station is reduced to the same strength as the signal to be read, then readability is much improved. The matter, however, can be taken a step further.

Reference to Fig. 4 will show, as has already been pointed out, that the change in curvature of the top bend of the curve is not so great as that of the lower bend. For nearly all signals a point on the straight part of the curve can be found where the two halves of the anode curve are equal, and therefore balance out. For signals, however, of different damping and different strength, owing to the difference in curvature of the upper and lower bends, these points, for a balance, will not all coincide, but will have different positions along the straight part of the curve. It is, therefore, often quite possible completely to eliminate the jamming station, and yet still be able to read the station one wishes to hear. In view of the fact that such an adjustment gives a large area to the negative part of the curve, the rectification is inefficient, and signals are reduced. It is for this reason that magnification after rectification becomes necessary in order to bring signals up to strength again. Having regard to the square law of the rectifier, it will be conceded that the only efficient and effective method of increasing the sensitiveness of the receiver is to magnify the high-frequency current before rectification. In the foregoing it has been explained that the adjustment for the elimination of jamming necessitates a low-frequency magnification after rectification, so the requirements which the amplifier has got to fulfil are as follows:—

- (1) Magnify before rectification.
- (2) Rectify.
- (3) Magnify after rectification.

HIGH-FREQUENCY MAGNIFICATION.

In Fig. 6 is shown the simplest circuit of the three-electrode valve, and, save for the introduction of the inductance "L" in the anode circuit, is the same as that in Fig. 2. In the case of ideal high-frequency magnification, the curve of the resulting anode current should be exactly the same shape as the curve of the impressed grid volts. Such a condition only obtains when the characteristic curve of the valve is straight over quite wide limits. For Morse signals, of course, it does not matter if there is a certain amount of distortion; this only becomes troublesome when one is trying to receive wireless telephony. If the grid potential is adjusted to a value "OL" so that the valve is working on the straight part of the characteristic (Fig. 4), the current in the anode circuit, which now contains the inductance "L," will be much greater than the current induced by the signal, and will have the same shaped curve and be of the same frequency. Such an arrangement constitutes a one-stage magnification of the current in

its high-frequency form, and is often referred to as one high-frequency magnification.

Before going further, we must investigate a little more closely what is actually happening in the valve itself. When the filament or cathode is incandescent, electrons are given off, and if the grid be charged positively with regard to the negative end of the filament, the electrons will travel towards the grid along the electrostatic lines of force thus produced. In rising through one volt, the speed gained is 6,000 cms. per second, and in rising through 100 volts, it is 60,000 cms. per second. When a positive potential is applied to the anode of the valve, electrostatic lines of force are created between the anode and the filament which lines pass through the grid, and there will be a constant positive potential drop along them over the space between the grid and filament. The effective grid voltage is the addition of this potential drop to the applied grid volts, having due regard to the sign of these applied grid volts.

Under the influence of its effective potential, therefore, the electrons start to move towards the grid, and the speed with which they arrive at the grid will vary with the variations of the grid potential. As the grid is in the form of a mesh or spiral, the majority of the electrons pass through it, and therefore immediately start travelling towards the plate at which they arrive at a high velocity. The number of electrons which the filament is capable of giving off depends upon the temperature at which it is being run, and that number of them which are attracted towards the grid depends upon the grid voltage. When the grid volts are sufficiently high, all the electrons which the filament can give off, assuming a constant filament temperature, are attracted towards it, pass through it, and arrive at the anode. As there are no more electrons to be attracted, any further increase in grid volts can produce no more anode current, and thus we arrive at the "saturated" condition.

RECTIFICATION.

In Fig. 7 is shown the introduction into the valve of a second grid, and the connections to this grid will be the same as those to the plate in Fig. 6. The fourth or outer electrode, to be known as "outer electrode," is shown connected to the filament. Now in our explanations of Fig. 6 we have shown that the electrons arrive at the plate with a high velocity, and, as in Fig 7, this plate is now in the form of a grid, the electrons will pass through it in the same manner in which they pass through the first grid.

Inasmuch as the outer electrode is at the same potential as the negative end of the filament, the electron, once through the second grid, starts to travel, as it were, uphill, for it is now under the action of a repelling force. As the drop in volts between the outer electrode and the second grid is equal to the rise in volts between the filament and the first grid, the speed of the electron at the outer electrode will be equal to its speed at the filament. For the purpose of this article it will be sufficient to assume that the electrons leave the filament with no initial velocity, and therefore from the preceding, it will be seen that their velocity becomes zero just before they arrive at the outer electrode. If now an alternating EMF be applied between the outer electrode and the negative end of the filament, during the positive half

of the wave, electrons will be attracted to the outer electrode, and during the negative half they will be repelled. Rectified current, therefore, will flow in the outer electrode circuit, and the efficiency of rectification will approximate to that of a crystal. The connections for

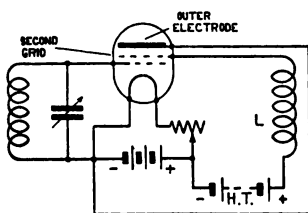


Fig. 7.

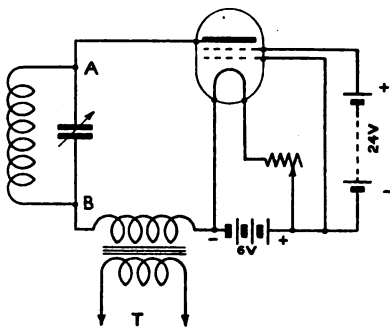


Fig 8.

the detection of signals with such an arrangement are shown in Fig. 8. The constant voltage applied to the first grid is of quite an arbitrary value, but must be sufficiently positive to enable an adequate current to flow in the second grid circuit.

Thus far we have not utilised the anode current that we have shown would be flowing in the inductance "L" (Fig. 6). If now this inductance is made to constitute the primary winding of a suitable

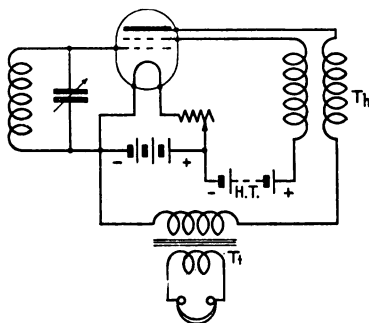


Fig. 9.

transformer, and the secondary winding of this transformer be inserted in the outer electrode circuit (Fig. 9), then the alternating current in the primary winding will induce an alternating EMF in the secondary winding, so that the outer electrode will be made alternatively positive and negative. We have already shown that the outer electrode circuit thus becomes a rectifier, but whereas in Fig. 8 the volts applied to it were those induced by the signal, in Fig. 9 the applied volts are the signal volts after they have been magnified as explained in Fig. 6.

LOW-FREQUENCY MAGNIFICATION.

The preceding considerations show that in the one valve we have already got one high-frequency magnification, and also rectification, and it now remains to arrange for low-frequency magnification. This can be provided for by coupling back the plate circuit to the first grid

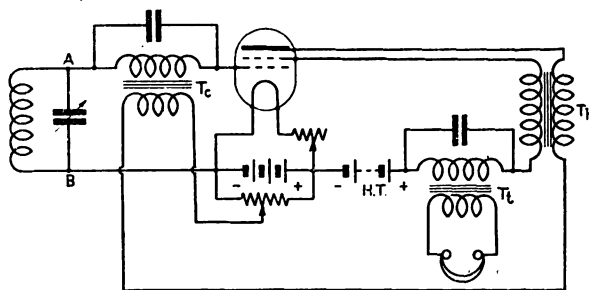


Fig. 10.

circuit. With such an arrangement, the rectified impulses in the outer electrode circuit will be impressed on the first grid, and will therefore produce similar magnified impulses in the circuit of the second grid. As these are already in a rectified form, the telephone transformer can now be transferred to the second grid circuit, and a signal then received

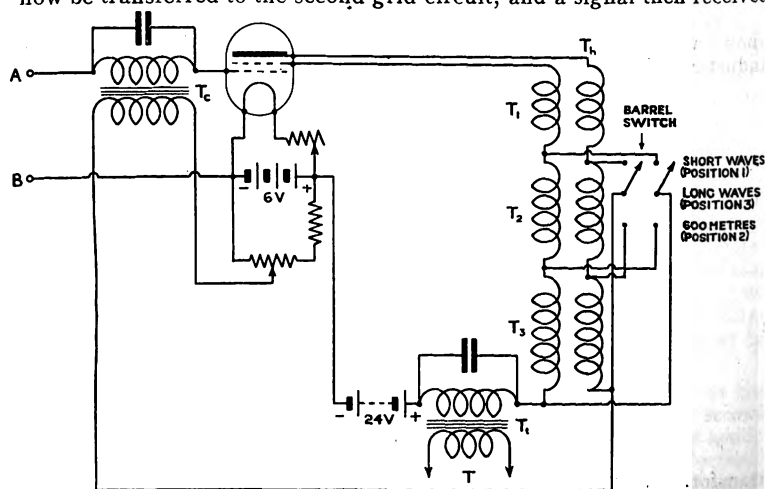


Fig. 11.

will have been magnified in its high-frequency form, rectified and magnified again in its low-frequency form. Fig. 10 shows the diagram of connections of the circuit. "Th" is the high-frequency transformer, and "Tc" is the transformer which provides the coupling between the outer electrode circuit and that of the first grid. "Tc" is an iron core

transformer, the ratio of the windings of which are 1 telephone transformer wound for low-resistance telegraph circuits of the first grid and that of the outer electrode frequency currents flowing in them, the windings of the "Tc" and "Th" in these two circuits, must be shunted in order to provide a low impedance path for these currents.

Fig. 11 shows in diagrammatic form the connections of a 91 amplifier. "Th" is made up of three separate windings connected in series. As in the case of the Type 71, with copper wire. The barrel switch has three positions (1) the transformers "T2" and "T3" are short circuited, "T1" is effective. This arrangement is for short waves, "T1" having been designed to cover wavelengths of 100 to 200 metres. In position (2) transformer "T1" is short circuited and "T2" is in series becoming effective. This arrangement is designed to cover the 600 metre range. In position (3) the transformers are in series, no windings being short circuited. This arrangement will cover most effective wave range that this arrangement will cover most effectively 2,000 metres to 4,000 metres. The potentiometer is in that anti-jamming adjustments, as explained in the first article, may be made. To prevent this adjustment being extra resistance has been put in series with the potentiometer for a given voltage change the slider has to be moved

transformer, the ratio of the windings of which are 1/1. "T_t" is the telephone transformer wound for low-resistance telephones. As the circuits of the first grid and that of the outer electrode have high-frequency currents flowing in them, the windings of the transformers, "T_c" and "T" in these two circuits, must be shunted by a condenser in order to provide a low impedance path for these high-frequency currents.

Fig. 11 shows in diagrammatic form the connections of the Type 91 amplifier. "T_h" is made up of three separate transformers connected in series. As in the case of the Type 71, they are wound with copper wire. The barrel switch has three positions. In position (1) the transformers "T₂" and "T₃" are short circuited, and only "T₁" is effective. This arrangement is for short waves, the transformer "T₁" having been designed to cover wavelengths of the order of 300 metres. In position (2) transformer "T₃" is short circuited, "T₁" and "T₂" in series becoming effective. This arrangement has been designed to cover the 600 metre range. In position (3) all the transformers are in series, no windings being short circuited, and the wave range that this arrangement will cover most efficiently is from 2,000 metres to 4,000 metres. The potentiometer is inserted in order that anti-jamming adjustments, as explained in the first part of this article, may be made. To prevent this adjustment being too critical, an extra resistance has been put in series with the potentiometer, so that for a given voltage change the slider has to be moved further.

**PATENT
SECTION**

- (A) Valve Patents during 1920.
- (B) British Patent Specifications.
- (C) Name Index to British Patents.
- (D) U.S.A. Patent Specifications.
- (E) Name Index to U.S.A. Patents.

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VALVE PATENTS FOR 1920

By I. SHOENBERG.

No. 124,721. By H. P. DONLE. (Assigned to Connecticut Telephone and Electric Co.)

The specification describes a new construction of valve, in which both the plate and the controlling electrode are placed outside the bulb containing the filament. In the drawing (see Fig. 1), 5 is a bulb, made of glass, quartz, or like material. The filament, 2, is placed within, while plate, 8, and controlling electrode, 6, are arranged outside the bulb. 6 and 8 "are of suitable conducting material, such as silver or copper, and may be applied to the globe in any suitable way, such as by electro-deposition, or shrunk on in the form of bands, or held on the globe by clamps." The plate, 8, is shown as separated from the controlling electrode, 6, by the insulating space, 7, the edges of which are of a serrated outline. "This increases the area of the two elements, which are opposed to each other." As to the operation of the device, the inventor offers the following explanation:—

"When the filament is lighted by the source of current at A, the globe, which is of glass or other material normally non-conductive to electricity, becomes warmed, and the electrons released from the incandescent filament act as carriers for the energy of the battery, B, from the target to the filament, enabling said battery to force a certain amount of current through the wall of the globe and across the intervening space to the filament. If a charge is now placed upon the electron deflector element, 6, by means of rectified radio oscillations, for instance, this rectification being due to the unilateral conductivity between the filament and electron deflector, the flow of electrons will be aided or retarded as the case may be, depending upon the polarity of the charge, and a very slight charge upon this conducting element, 6, is sufficient to affect the flow of current through the other branch, which includes the receivers, to a large degree. The conducting element, 6, thus acts, in effect, as a deflector, and by its deflection of the electrons to a secondary path serves to affect the receiving circuit, and thus produce a true reproduction of the radio signals. The magnified effects obtained in the receiving circuit enable the detection of very weak signals, and hence make the device more sensitive, enabling the detection of such weak signals as would probably have been 'lost' heretofore. It will be noted that the operation depends upon the electron flow through the warmed glass or other normally non-conducting wall of the globe, and not simply upon the flow through an evacuated space, as heretofore. In other words the efficiency of the device is not dependent solely upon the maintenance of a proper vacuum."

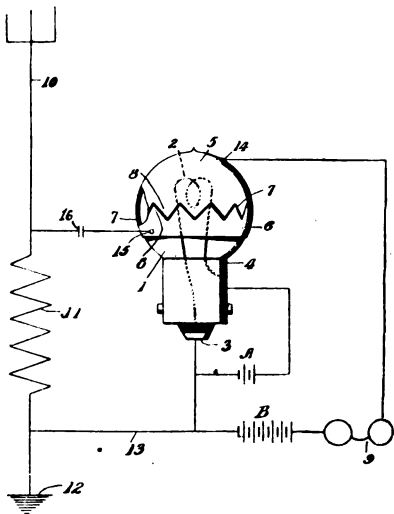


Fig. 1.

No. **130,965**. By H. P. DONLE. (Assigned to Connecticut Telephone and Electric Co.)

The invention relates to a new construction of valves, in which the plate is placed outside the bulb containing the heated filament. In Fig. 2, 5 is a bulb, made of glass or quartz, or the like, containing the filament, 6, heated by battery, A, and the helical grid, 10. The plate, 9, is placed outside the bulb, and is connected to the filament through the telephone, 13, and battery, B. The operation of the device is explained by the inventor as follows:—

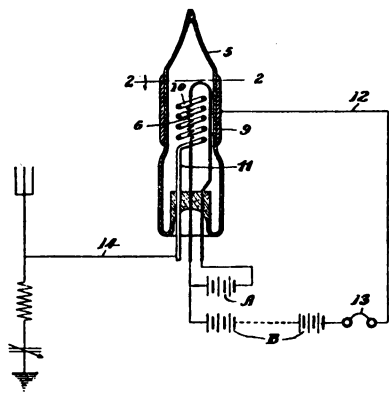


Fig. 2.

"The filament when energised by the battery, A, heats up the globe, which, as before stated, is usually made of glass or other material, such as quartz, normally non-conductive at room temperature, but which, when heated to a higher temperature of, say, 100° C. or over, becomes conductive to a certain degree, whereupon current from battery, B, passes from the anode through the heated glass to the layer of electrons on the inner wall of the globe, said current being conducted between this wall and the filament by the electron stream.

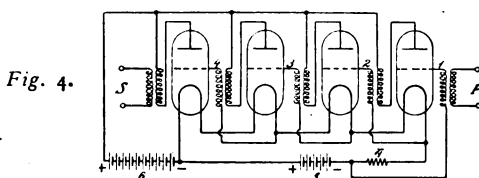
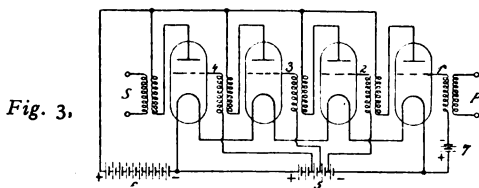
"If a charge is now placed upon the controlling member, as by means of radio oscillations, for instance, the flow of current through the glass is decreased by the decreasing in area of the electrons lying upon the inner wall of the globe, the controlling member apparently acting in this case to absorb unto itself a certain number of these electrons."

The specification also contains the following statement:—

"This valve, generally speaking, is independent of the vacuum about the filament; in fact, for many purposes an inert gas may be used, in which case, of course, the conduction would be by means of ions instead of electrons."

No. **134,832**. By SIEMENS and HALSKE AKTIENGESellschaft.

The specification describes a convenient method for impressing a P.D. between the filaments and grids of cascade amplifiers. For this purpose



the heating battery is utilised in the manner shown in Figs. 3 and 4. It will be seen that the filaments are connected in series, and the grid potentials (relatively to the filaments) are obtained either by connecting them to intermediate points of the lighting battery, 5, as in Fig. 3, or by utilising the potential drop along the filaments, as in Fig. 4. For valve 1, however, a special source of potential will be necessary, and this is furnished in Fig. 3 by battery, 7, and in Fig. 4 by the potential drop across resistance, r_1 .

No. 135,792. By W. J. POLYBANK.

The invention relates to the construction of bases for valves, and is illustrated in Figs. 5, 6, and 7, which are described in the specification as follows:—

"Four contact pins, 1, have roughened sides at their base, and are held in a jig while being moulded in the block, 2, formed of insulating material.

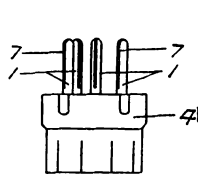


Fig. 5.

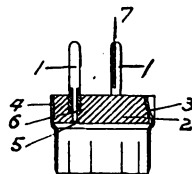


Fig. 6.

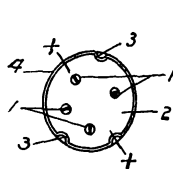


Fig. 7.

The block is formed with wedge-shaped grooves, 3, on its periphery, and after the block is slipped into the shell, 4 (which has previously been fitted to the globe of the valve), the metal of the shell is forced into the grooves by a specially shaped tool, and the holder, 2, is firmly fixed in the shell. The lead wires from the globe pass through the passage, 5, in the block, along the bore, 6, of the pins through the slot, 7, therein, and are secured to the pins by soldering."

No. 136,712. By WESTERN ELECTRIC CO., LTD. (A communication from the Western Electric Co., of America.)

When employing valves of the three-electrode type, with the output and input circuits coupled in any manner whatever, for the purpose of producing oscillations, it is well known that besides the fundamental frequency determined by the elements of the oscillating circuits, higher harmonics are also generated. For several reasons, however, a "pure" wave may be desired and the present invention proposes to filter out the undesirable harmonics in the manner shown on the drawings (Figs. 8 and 9).

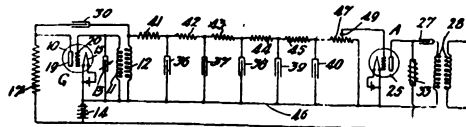


Fig. 8.

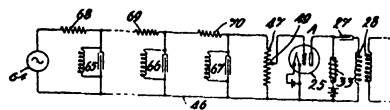


Fig. 9.

condenser, 36-40. If the capacities of the condensers are properly chosen,

their impedance will be lower for the harmonics than for the fundamental frequency. It follows that the currents due to the harmonics will possess a comparatively larger value and will have a larger extent in the resistance than those due to the fundamental oscillation. The P.D. across the last condenser, 40, will be entirely on the fundamental oscillation. The voltage across the filtered H.F. current flowing in resistance, 47, shunted by a blocking condenser, 27, in order to obviate a short circuit through inductance, 28. The choke coil, 33, prevents the current from circulating in the battery circuit. Another advantage of interaction between the resistances, 41-45, consists in the fact that it is to be borne in mind when choosing the magnitude of the filter is shown in Fig. 9. Here the circuit is tuned to the fundamental oscillation, and will therefore present almost infinite impedance to currents produced by the latter. On the other hand, the currents due to harmonics will be comparatively low and will be consumed in the resistances.

No. 137,098. By L. B. TURNER and R. H. WAGNER.

In the known methods proposed for controlling by the radiated power, the power which has to be spent in the circuits is proportional to the radiated power. The present invention describes an arrangement by means of which the expenditure in controlling can be kept very low even when dealing with powerful oscillations.

As will be seen from Fig. 10, the microphone, 1, is made to vary the anode potential of the generating valve, 3, the output and input circuits of which are coupled by means of coils, 6 and 7. The H.T. supply is shown in the form of a battery, 15. The oscillations produced by valve, 3, are of such amplitude that the control through the voice can be made perfect without any special means (as for instance amplifying the microphone variations). The modulated oscillation is then amplified by valve, 4, the grid circuit of which is coupled through coil, 8, to the plate circuit of valve, 3. The oscillation is transmitted to aerial, 5. In order to obtain a variable gain, a special battery, 10, is inserted between the grid and the valve, 4, and the voltage of this battery is so chosen as to vary the negative permanently or during a considerable portion of the oscillation. Instead of a special battery, a resistance can be employed.

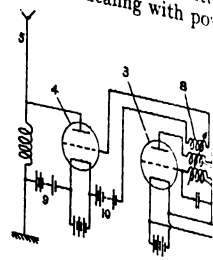


Fig. 10.

No. 137,876. By G. F. PARTRIDGE and B. S. SMITH.

The object of the invention is to apply the resistance coupling in cascade to the amplification of low frequency oscillations. The use of ohmic resistances only in the plate circuits, it is expected, will retain the same "colour" as those which are used in the input terminals. On Fig. 11, K and L are the input terminals, B, R,

impedance will be lower for the harmonics than for the fundamental frequency. It follows that the currents due to the harmonics possess a comparatively larger value and will be dissipated to a larger extent in the resistance than those due to the fundamental oscillation. The P.D. across the last condenser, 40, will depend almost entirely on the fundamental oscillation. The voltage drop due to the filtered H.F. current flowing in resistance, 47, shunting the last condenser, is amplified by tube A, the plate circuit of which contains the tuning condenser, 27, in order to obviate a short circuit of battery, 14, through inductance, 28. The choke coil, 33, prevents the amplified H.F. current from circulating in the battery circuit. Another advantage connected with the employment of the resistances, 41-45, consists in the elimination of interaction between the filtering and oscillating circuits, and this has been borne in mind when choosing the magnitude of those resistances. A modified type of filter is shown in Fig. 9. Here the circuits, 65-67, are tuned to the fundamental oscillation, and will therefore present a path of almost infinite impedance to currents produced by the latter. On the other hand, the currents due to harmonics will be comparatively large and will be consumed in the resistances.

137,098. By L. B. TURNER and R. H. WAGNER.

In the known methods proposed for controlling by the voice the energy radiated from the aerial, the power which has to be spent in the controlling circuits is proportional to the radiated power. The present specification describes an arrangement by means of which the expenditure of energy on controlling can be kept very low even when dealing with powerful radiators.

As will be seen from Fig. 10, the microphone, 1, is made to vary the grid potential of the generating valve, 3, the output and control circuits of which are coupled by means of coils, 6 and 7. The power supply is shown in the form of a battery, 15. The oscillations produced by valve, 3, are of such magnitude that the control through the microphone can be made perfect without any special means (as for instance amplifying the microphone variations). The modulated oscillation is then amplified by valve, 4, the grid circuit of which is tuned through coil, 8, to the plate circuit of valve, 3. The amplified oscillation is transmitted to aerial, 5. In order to obtain a very high amplification, a special battery, 10, is inserted between the grid and filament of valve, 4, and the voltage of this battery is so chosen as to keep the grid positive permanently or during a considerable portion of the period of the oscillation. Instead of a special battery, a resistance shunted by a condenser can be employed.

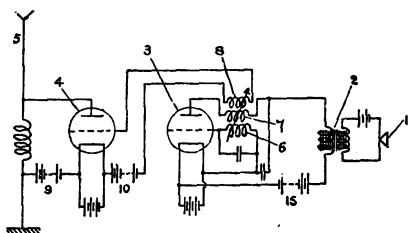


Fig. 10.

137,876. By G. F. PARTRIDGE and B. S. SMITH.

The object of the invention is to apply the resistance coupling of valves in cascade to the amplification of low frequency oscillations. Owing to the use of ohmic resistances only in the plate circuits, it is expected that the amplified sounds will retain the same "colour" as those which give rise to the initial variations on the grid of the first valve. On Fig. 11, which illustrates the invention, K and L are the input terminals, B, B¹ and B² high resistances

of the same order as the effective resistances of the valves (about 50,000 ohms when using French hard valves). The condensers H H^1 allow of applying the voltage drop across the resistances B and B^1 due to the magnified variation at the input terminals between filament and grids of valves A^1 and A^2 . At the same time they eliminate the danger of having permanently between

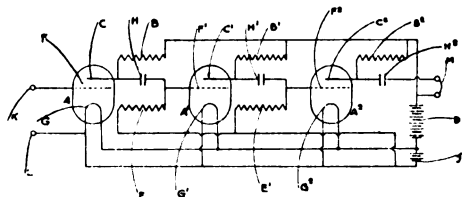


Fig. 11.

these grids and filaments a P.D. equal to a considerable fraction of the voltage of the H.T. battery, 5. Condenser H^2 prevents the D.C. from flowing through the telephone M . The resistance E and E_1 (about 200,000 ohms each) serve as leaks between grids and filaments of valves A^1 and A^2 . This is necessary, for otherwise the accumulation of negative electrons on the grids would stop the flow of electronic current through the valves.

No. **138,383**. By M. LATOUR.

The specification describes a device which would give automatically an alarm immediately on the filament of a valve burning out. For this purpose the iron core, 3 (Fig. 12), is provided with two coils, 3, 4, wound in opposite directions. Coil, 4, consists of a few turns of thick wire, while coil, 5, has a

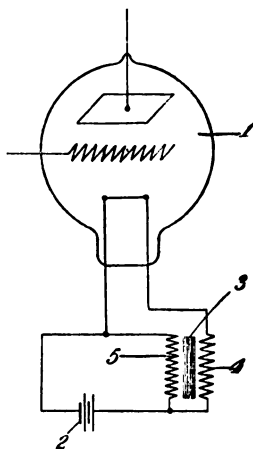


Fig. 12.

large number of turns of fine wire. The ampere-turns on both coils are equal, and no magnetic field is therefore produced as long as current is flowing in both windings. On the filament burning out, the balancing effect due to coil, 4, will disappear, the coil, 3, gets magnetised, and an alarm signal of one kind or another will be given.

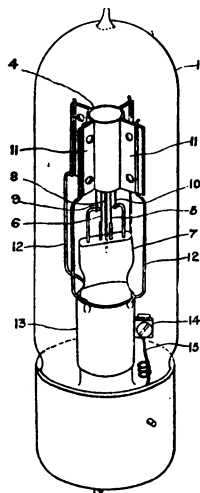


Fig. 13.

No. 139,748. By S. DUSHMAN.

The invention relates to an improved construction of valves. As will be seen from the drawings (Figs. 13 and 14), the anode, 4, is of a cylindrical shape, and has for the purpose of better cooling, ribs, 11. The ribs are formed by suitably folding a thin sheet of metal. The method of supporting the anode is perfectly clear from the drawing and needs no further explanation. The grid has the form of a spiral made of comparatively fine and flexible wire, so that the coil could not support itself, and in order to maintain the desirable shape each turn is welded on the stout wires, 9 and 10.

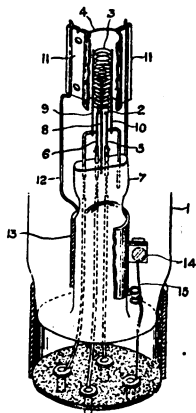


Fig. 14.

No. 139,867. By L. B. TURNER.

The specification describes an arrangement for obtaining retroaction between the grid and plate circuits of a valve. The principle can be easily understood from Fig. 15. If an additional P.D., due to a signal, say, is introduced between 7 and 8, so as to make v_1 larger, for instance, there will flow a larger current in the plate circuit of valve 1, and owing to this the potential drop across resistance, r_1 , will also increase. By paying attention to the sense in which the current flows it will be seen that this will lead to a decrease of v_2 , and therefore to a decrease in the anode current of valve 2. The drop of potential across resistance r_2 , which, taking into account the signs, works against v_1 will decrease, thus resulting in a further increase of the P.D. between the filament and the grid of valve 1. This process will go on until a new state of electrical equilibrium between the two valves is reached. It is clear that a small variation of e will lead to a considerably amplified variation of $V_1 - V_2$ (V_1 and V_2 being the anode potentials). The inventor states that an amplification of 1600 ($e = 0.005v$, $V_1 - V_2 = 8v$) was obtained in a practical case under the following conditions: batteries B_1 and B_2 were about 95 volts each, batteries b_1 , b_2 —each about 4 volts, $R_1 = R_2 = 55,000$ ohms, $r_1 = 9,500$ ohms, $r_2 = 13,600$ ohms.

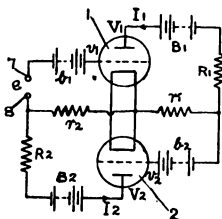


Fig. 15.

The effect of retroaction can be looked upon as equivalent to the introduction of negative resistance, so that the net resistance of the circuit is determined by the algebraic sum of the positive and negative resistances. The amount of negative resistance for the arrangement shown on Fig. 15 is given by:—

$$a_1 \left[\frac{g_1 g_2 r_1 r_2}{1 + a_2 (r_1 + R_2)} \right] \quad \text{where}$$

a_1 , a_2 , g_1 and g_2 are the conductance parameters of the valves.

It follows that the net resistance of the anode circuit of valve 1 will be:—

$$\frac{1}{a_1} + r_1 + R_1 - \frac{g_1 g_2 r_1 r_2}{a_1 [1 + a_2 (r_1 + R_2)]}$$

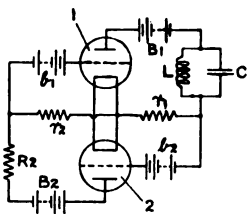


Fig. 16.

If an oscillatory circuit, L, C , is inserted in place of R_1 (see Fig. 16), and the constants are so adjusted as to obtain a net negative resistance, the arrangement can be employed for generating oscillations, the frequency of which will depend on the values of L and C .

For further information the reader is referred to the article entitled "The Kallitron, an Aperiodic Negative-Resistance Triode Combination," published in the *Radio Review* for April, 1920, p. 317.

No. 140,166. By the BRITISH THOMSON-HOUSTON CO., LTD. (Communicated by G.E.C. of America.)

The invention relates to a method of supporting the anode of a valve.

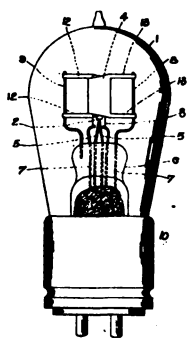


Fig. 17.

In a rectangular sheet of metal, 11 (Fig. 19), the strips, 12 and 13, are partly cut away, as shown in the drawing. The sheet is then bent into a cylinder, and the strips are arranged to extend in opposite directions (Fig. 18). The ends of the strips are wound round the specially provided arms, 8, 9 (Fig. 17), and welded to them. In this manner firm support for the anode is obtained.

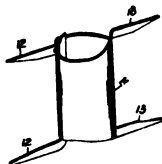


Fig. 18.

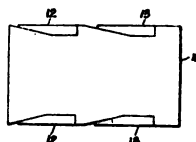


Fig. 19.

No. 140,538. By C. S. FRANKLIN.

It is well known that directional effects can be obtained by means of suitably spaced aerials. In such systems, however, it is important to control the phase difference between the oscillations as well as their intensities, for these two factors will determine the shape of the characteristic curve of radiation. This control can be obtained in a comparatively convenient manner by feeding both aerials from a common source of H.F. currents. For considerable wavelengths this arrangement involves, however, long leads, and therefore heavy losses. The present invention eliminates this difficulty by employing a central source of very small power, and amplifying the weak currents by means of three-electrode valves, say, placed in the immediate vicinity of the aerials. The invention is illustrated by Fig. 20, which is explained by the inventor as follows:—

"The oscillations in the two aerials are generated by valves, V^1, V^2 , respectively, the power being supplied by a dynamo, D , and conveyed to each valve by wires, P^1, P^2 . This is, however, a matter of convenience, as, if desired, each valve may have its own independent source of power."

" CV is a control valve of relatively smaller power and situated at some convenient place, preferably equidistant from the two aerials. This control valve is arranged to generate oscillations of the desired frequency."

"A coil, M , in the anode circuit of the control valve is coupled to coils, N^1 , N^2 , connected through tuning condensers, F^1 , F^2 , to lines, L^1 , L^2 , which convey the oscillations from the control valve to transformers, T^1 , T^2 , the secondaries of which are connected to the grids of the valves, V^1 , V^2 , and control the frequency and phase of the oscillations generated by them."

"The frequency is determined by the valve, CV , and the phases by the tuning of the circuits comprising the primaries of the transformers, T^1 , T^2 , the lines, L^1 , L^2 , the condensers, F^1 , F^2 , and the coils, N^1 , N^2 , respectively. The phases may also be controlled by the tuning of the aerials, A^1 , A^2 ."

"It is necessary to arrange the twin leads of L^1 and L^2 so that the waves radiated by A^1 and A^2 affect them equally and produce no reaction effect on the valves, V^1 , V^2 , or CV ."

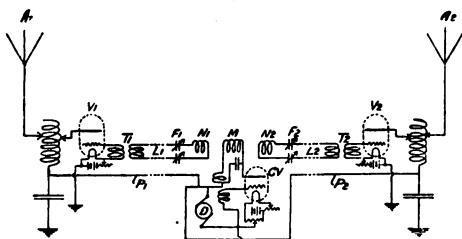


Fig. 20.

No. 141,900. By R. WHIDDINGTON.

It is well known that the grid and plate circuits of a valve can be so adjusted that the valve will be on the "threshold" of oscillation, and on the slightest disturbance taking place the oscillations will set in. The above adjustment gives the possibility of bringing about powerful oscillating currents, even by means of very weak signals. It is, however, necessary that the oscillation should be quenched out in order to bring the apparatus back to its quiescent state, and the present invention proposes to attain this object by means of the arrangement shown on Fig. 21.

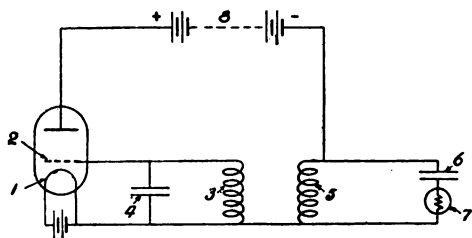


Fig. 21.

of coils, 3, 5, is so adjusted that the slightest increase in the mutual inductance will be sufficient to cause the small incandescent lamp, 7, in the plate circuit to glow, owing to the oscillations which will set in. Upon a small potential disturbance being applied between grid and filament the lamp will therefore begin to glow, and the resistance of the plate circuit will increase. This will result in the inhibition of the oscillation immediately on the ceasing of the disturbance.

No. 142,207. By THE BRITISH THOMSON-HOUSTON CO., LTD. (Communicated by G.E.C. of America.)

The invention relates to the construction of grids for thermionic valves, and has for its object to maintain the spacing between the wires, which form the grid constant. As will be seen from Fig. 22 "the grid is made up of a large number of turns of fine wire wound around the framework, 11, as indicated. Upon each side of this framework over which the grid wire passes we provide closely coiled spirals of fine wire, 20, as indicated. Each turn of the grid wire slips between two adjacent turns of this spiral, and one or more turns of the spiral are interposed between adjacent turns. It will be apparent

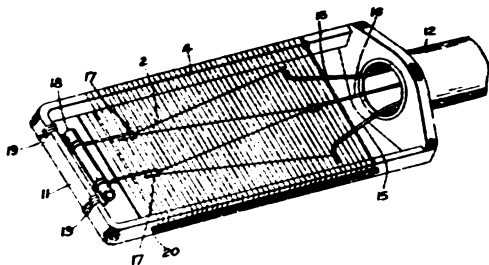


Fig. 22.

that with this construction even though the grid wire may expand so as to become somewhat loose upon the framework, 11, adjacent turns of the grid wire cannot come in contact with one another and hence the desired spacing of the turns will always be maintained."

No. 142,333. By L. B. TURNER.

Where electromagnetic relays are used in connection with amplifying valves there is always a certain deflecting power existing, even in the absence of the signal to be received. This is due to the normal anode current. Such a pre-existing effect, however, tends to diminish the sensitiveness of the relay, and the present specification describes a method for removing this difficulty. As will be seen from the drawing (Fig. 23), a perfectly symmetrical arrangement of two valves, T_1 and T_2 , is employed. One coil, W_1 , of the relay is inserted in the plate circuit of T_1 , while the other coil, W_2 , is inserted in the plate circuit of T_2 . The windings are so arranged that in the absence of a signal on line, L_1 L_2 , *i.e.*, when there is no P.D. between L_1 L_2 , there is no deflecting effect on the tongue of the relay. On the arrival of a signal there will be a potential drop across the resistance R , and while grid G_1 will become more positive, say, grid G_2 will become more negative with the result that the current in W_1 will increase, while the current in W_2 will decrease. The balance which existed before will be upset and the tongue of the relay will be deflected to the left or the right, according to the relative signs of L_1 L_2 .

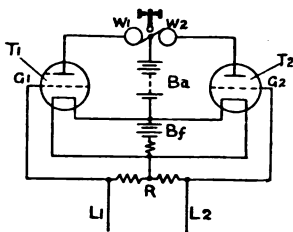


Fig. 23.

No. **142,571**. By **WESTERN ELECTRIC CO., LTD.** (Communication from the Western Electric Co. of America.)

In order to obtain several frequencies from one source of A.C., use may be made of the upper harmonics which appear when the form of the fundamental wave is distorted. According to the present invention the distortion is obtained by working on the saturated portion of the characteristic of a valve. One method of application is shown on Fig. 24. The source of A.C., 20, is coupled to circuit, 21-23, tuned to the frequency of 20 and connected between grid and filament of the valve, 22. The maximum voltage applied to grid, 22, is in excess of that required for obtaining the saturation current in the plate circuit. Owing to this, the wave produced in line, 26, which is coupled to the plate circuit by means of transformer, 25, will possess a form more or less like a trapezoid. Such a wave, as it is well known, can be analysed into

several components, the frequencies of which will be multiples of the fundamental frequency. In order to separate the several harmonics, the line,

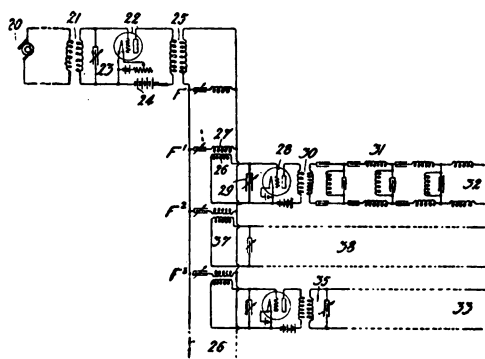


Fig. 24.

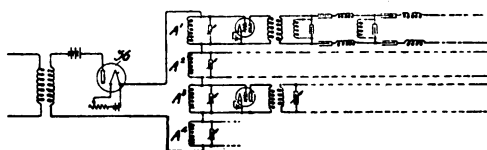


Fig. 25.

26, is bridged by the composite conductors, F, F^1, F^2, F^3 , etc., each of which consists of an inductance and capacity. The latter are so proportioned that F, F^1, F^2, F^3 , are in tune with the frequencies of the fundamental wave first, second, third, etc., harmonics respectively. Each frequency is then passed on to lines 32, 38, 33, etc., with or without amplification. If a very pure harmonic is desired, a filter, 31, as shown in line, 32, may be employed.

Instead of a three-electrode valve, an ordinary Fleming rectifier may be used. The suppression of alternate half-cycles will lead to further distortion in addition to the effect obtained through saturation. This method is shown on Fig. 25, where the current with fundamental frequency is rectified by the valve, 36, containing only two electrodes. The circuits, A^1, A^2, A^3, A^4 , are tuned to the frequencies of the harmonics. From the method of connections it is clear that circuit A^1 , for instance, which is tuned to the frequency of the first harmonic will present a very high impedance to currents of this frequency. It follows that the voltage impressed on the grid of the amplifying valve inserted in A^1 , will be determined almost exclusively by the first harmonic.

No. 144,803. By BRITISH THOMSON-HOUSTON Co., LTD. (Communicated by G. E. Co. of America.)

It has been proposed before, for the purpose of modulation, to shunt an inductance inserted in the aerial with the filament-plate path of a valve. By impressing the voltage variations caused by the voice acting on the microphone between the grid and filament of the valve, the resistance between the filament and plate, and therefore the amount of energy diverted from the aerial, is made to vary in sympathy with the voice. The present specification describes an arrangement for modulation carried out on the above lines, but somewhat modified in order to meet certain practical requirements.

On the drawing (Fig. 26) the antenna is coupled to the H.F. generator, 2, and the closed circuit, 5-6-7-7-8, tuned to the frequency of, 2. By properly adjusting the transformer, 4-5-8, a high voltage can be made to build up across condensers, 7, 7, and the amount of energy required for maintaining this voltage will be very small. To the external terminals of the condensers are connected the plates, 9 and 10, of valve 11, the grid of which is connected to the secondary of the microphone transformer, 17. The filament, 12, and the junction between the condensers, 7, are both earthed, so that the alternative plate circuits, 14-7-10-12-15 and 14-7-9-12-15, are obtained. When the

microphone is spoken into, H.F. energy will be absorbed by the first circuit during the half-cycle when 10 is positive, and by the second circuit during the next half-cycle. It will be seen that in this manner energy will be diverted from the antenna in accordance with the voice. The special advantages of the described arrangement are pointed out in the specification as follows:—

"Our invention is especially suitable when the inductance necessary for tuning the antenna is but a small part of the total inductance. In such

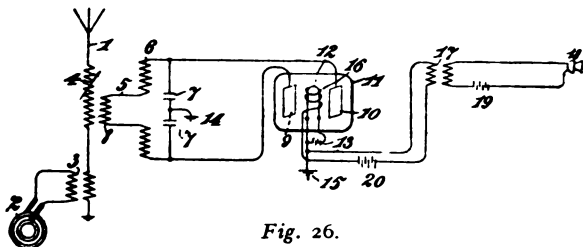


Fig. 26.

a case the inductance, 4, may be made much larger than is necessary for tuning, but this inductance will in effect be neutralised by the condensers, 7, and the final effect so far as varying the effective resistance of the antenna is concerned will be the same as though the inductance, 6, of the oscillation transformer were connected directly in series with the antenna."

No. 146,610. By P. P. ECKERSLEY.

In wireless telephony with valve generators, modulation by the voice is very often effected by varying the anode potential. In the case of the

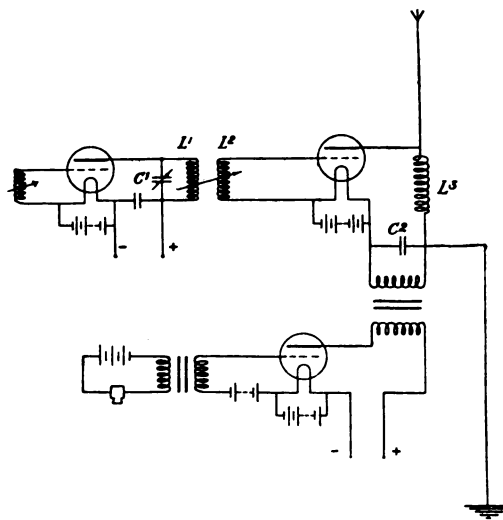


Fig. 27.

circuits being so arranged that generation takes place only when the microphone is energised, this method of modulation leads to distorted speech, owing to the fact that there is a time lag between the application of a P.D. between the plate and filament and the appearance of H.F. oscillations. The present specification describes a method of obviating this drawback. The left-hand valve shown on Fig. 27 is made to generate oscillations of the desired frequency and of comparatively small amplitude, and its output circuit, L_1, C_1 , is coupled to the grid circuit of the power valve by means of the transformer, L_1, L_2 . It is obvious that as long as no potential is applied to the plate of the power valve the antenna does not radiate. As soon, however, as the microphone is energised, the necessary H.T., varying in sympathy with the voice (microphone—amplifier—transformer—condenser, C_2), will be applied between the plate and filament,

and modulated H.F. current will appear in the aerial without any lag, owing to the permanently existing variation of potential on the grid of the power-valve.

No. 147,252. By B. HESKETH.

If a valve is provided with two controlling electrodes (which may be in the form of grids or plates), so arranged that a P.D. applied between them creates an electric field, either transverse, or possessing a component which is transverse, to the electric field due to the P.D. between plate and filament, the functional relationship between the P.D. applied between the controlling electrodes and the plate current is given by Fig. 29. Such a valve lends itself to various applications. Fig. 30 shows how the four-electrode valve can be employed as a detector. It is obvious from the curve on Fig. 29 that the variations of P.D. between *c* and *d*, due to the received signals, will lead to a decrease of the current of the plate, *e*, no matter whether *c* is positive, and

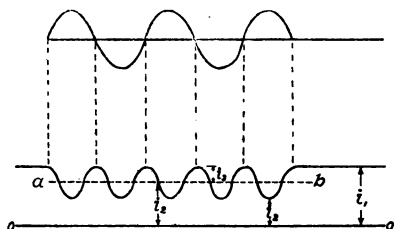


Fig. 28.

Oscillation impressed by A.

- i_1 Plate current when no P.D. is applied between C.D.
- i_2 Value of plate current at any moment when oscillations from source A are impressed between C.D.
- i_3 Current flowing in S (with *ab* as zero line).



Fig. 29.

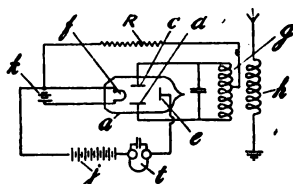


Fig. 30.

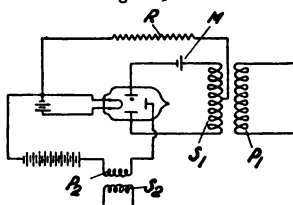


Fig. 31.

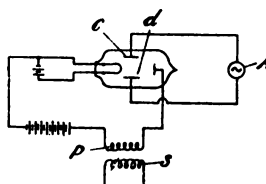


Fig. 32.

d negative, or vice versa. The high resistance, *R*, is introduced in order that the accumulation of charges on *c* and *d* should leak away. The circuit shown on Fig. 31 illustrates the use of the valve as an amplifier. As will be noticed, the battery, *M*, will maintain a permanent P.D. between *c* and *d*. By properly adjusting the voltage of *M*, the oscillations impressed through transformer, *PS*, will be magnified and reduced substantially without distortion in the output circuit, *P*₂, *S*₂. The valve can also be employed for doubling the frequency. For this purpose the oscillations from a source, *A* (see Fig. 32), are impressed between *c* and *d*. As will be seen from Fig. 28, which is drawn with the assistance of the characteristic on Fig. 29, the frequency of the current in secondary, *S*, of transformer, *PS*, will be doubled.

No. 147,320. By N. LEA and J. REE.

When employing the valve as a generator of H.F. oscillations for transmission, it is desirable to place the key in such a manner as to make or break the H.T. supply to the anode, for with the well-known method of inserting the key in the leak, shunting the grid condenser, periodic trains of oscillations are induced in the antenna, even when the key is raised. On the other hand, if the key is to interrupt the H.T. supply, steps must be taken to eliminate sparking. With the position of the key adopted in the present specification (see Fig. 33), the potential drop between its contacts (on being raised) is impressed between grid and filament, and in such a manner that the grid becomes highly negative. This, of course, causes the H.T. supply current to decrease as soon as the contacts are separated even by a very small distance. No heavy sparking can, therefore, take place.

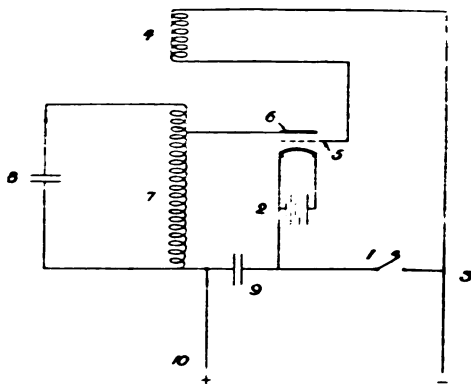


Fig. 33.

No. 148,582. By W. H. ECCLES and F. W. JORDAN.

The invention relates to a method of utilising three-electrode valves for obtaining relay effects. In the arrangement shown on Fig. 34 two valves are combined in such a manner that the grid filament of one is shunted by a comparatively large resistance (R_1 and R_2), which forms a part of the plate circuit of the other. Suppose that by means of a transformer, p , s , a small, say, positive potential is impressed on grid, g_1 . This will lead to an increase in the plate current, and therefore to an increase in the potential fall across resistance, R_1 . As the battery voltage is constant, an increase in the P.D.

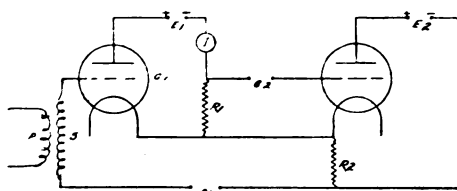


Fig. 34.

between the terminal of R_1 must be accompanied by a decrease in the plate potential of the first valve. Owing to this the grid of the second valve which is connected to the plate of the first, will become less positive, and the plate current of the second valve will decrease. Owing to the decrease in the potential fall across R_2 , the plate potential of the second valve will increase, and the grid of the first valve will become more positive, the plate current being further increased. This process will continue and, provided the resistances and valve constants have been suitably chosen, will result in the anode current of the first valve reaching the highest value possible for the given anode voltage and filament current. On the other hand, the anode current of the second valve will fall to the smallest possible value. An instrument, I , inserted in the plate circuit of one of the valves will therefore, give an indication.

In order to restore the arrangement to the initial condition it will be

necessary to interrupt, the operation of one of the valves, as, for instance, by dulling its filament.

On the other hand, it is possible to choose the resistances and valve constants in such a manner that the changes described above will persist only as long as the disturbance applied to the grid of the first valve continues. On the cessation of that disturbance the electrical magnitudes will assume their initial values.

No. **148,632**. By H. J. ROUND.

In wireless telephony it is important that the H.F. oscillations, which are used in the transmission of speech, should not be produced when the microphone is not spoken into, otherwise a special device becomes necessary for switching over from transmission to reception, and *vice versa*. According to the present invention,

such a transmitter, "quiescent" during the intervals of silence, is obtained in the following manner: The microphone, M (Fig. 35), is connected in series with the battery, B, and the primary windings of transformers, T_1 and T_2 . The secondary of transformer, T_1 , is connected through a rectifier, R, to the terminals of condenser, C, on the one hand, and to the plate and filament of the generating valve on the other.

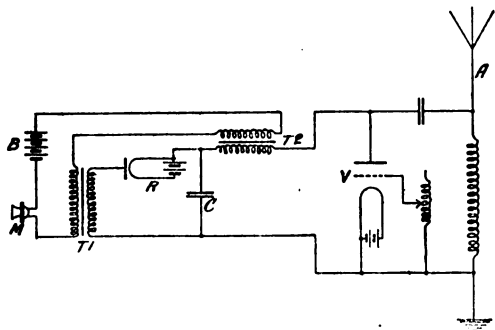


Fig. 35.

It will be seen that when the microphone is spoken into, a part of the energy is utilised for creating, by means of transformer, T_1 , and rectifier, R, a D.C. high-tension potential difference between plate and filament of valve, V, which starts generating H.F. oscillations of a period determined by the antenna, A. At the same time voltage variations in sympathy with the voice are impressed on the anode through transformer, T_2 . The antenna will thus radiate modulated oscillations. During the periods of silence, however, as there is no source of supply in the plate circuit of the valve, no oscillations will be generated.

No. **149,018**. By W. H. ECCLES and F. W. JORDAN.

It is well known that with the ordinary so-called "reaction" arrangement of the plate and grid circuits of a three-electrode valve, the oscillations obtained are not symmetrical. This is specially the case when the coupling is close, for the grid voltage becomes then so high that the representative point is carried to the "saturation" branch of the characteristic. Owing to this, harmonics are produced which cause the lack in symmetry of the oscillations referred to above.

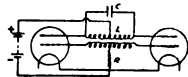


Fig. 36.

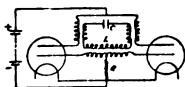


Fig. 37.

More perfect oscillations can be obtained by the use of a pair of valves in parallel in the manner indicated on Fig. 36. Here the oscillating circuit LC is so arranged that an increase in the anode current of one valve imparts to this circuit an impulse in a direction opposite to that which results from the increase in the anode current of the other valve. It follows that while one valve stimulates the oscillating circuit during one half-cycle, the other valve acts in the same way during the second half-cycle.

Fig. 37 shows the same arrangement, LC being, however, coupled inductively to the plate circuits.

In both figures R denotes a large resistance, which serves as a grid leak. It is obvious that the oscillating circuit may be placed between the grids of the valves instead of between the anodes.

No. 149,076. By S. R. MULLARD.

The invention relates to the construction of high-power valves, and is illustrated on Figs. 38 and 39, which are explained as follows:—

"The bulb, 1, consists of a cylinder of fused silica, and the filament, 2, preferably made of tungsten is mounted in its longitudinal axis. The tubular seals, 3, by which the

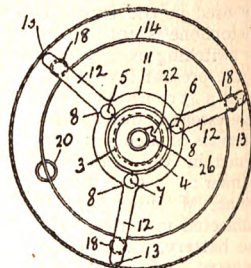
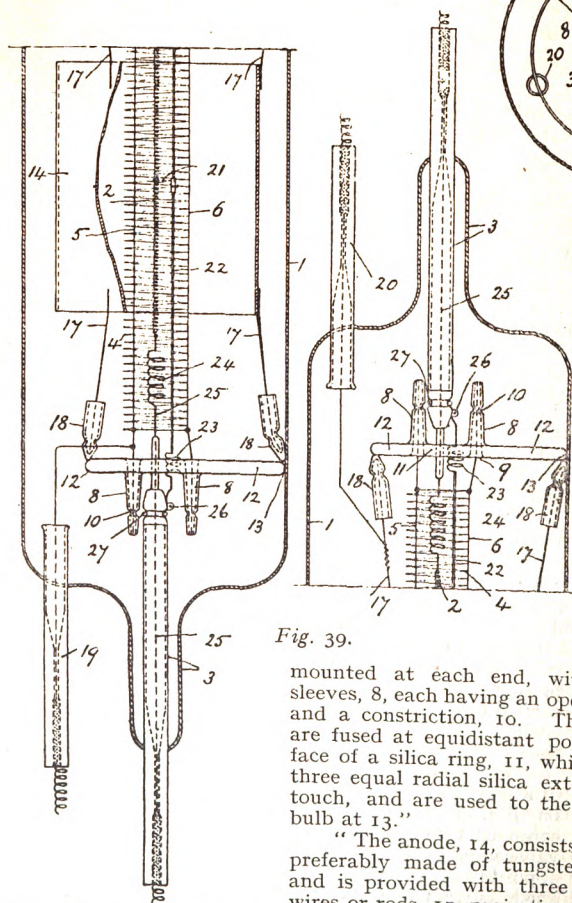


Fig. 38.

filament is mounted at each end, are made long and narrow to allow for breaking off and resealing after the burnt-out filament has been replaced. The inner tubes, 3, in which the filament leads are sealed are secured by being fused to the outer end of the outer tubes, 3."

"The grid, 4, consists of a wire wound spirally and secured upon three wires, 5, 6, 7,

Fig. 39.

mounted at each end, within and by silica sleeves, 8, each having an open mouth or end, 9, and a constriction, 10. The silica sleeves, 8, are fused at equidistant positions around the face of a silica ring, 11, which is provided with three equal radial silica extensions, 12, which touch, and are used to the inner wall of the bulb at 13."

"The anode, 14, consists of a metal cylinder preferably made of tungsten or molybdenum, and is provided with three equidistant metal wires or rods, 17, projecting at each end. The free ends of these wires or rods are sealed within silica sleeves, 18, similar to the sleeves, 8, used for mounting the grid wires. These sleeves have

sealed ends which coincide with the extremities, 13, of the 12, of the grid mounting ring, 11, and are fused with these inner wall of the bulb, at 13."

"It will be seen that the concentricity of the various electrical connections from the grid and anode are brought out by seals, 19 and 20."

"In a modification, the grid supporting ring extensions, 1, 18, may be fused together prior to insertion into and fusion of molybdenum or tungsten wire loop, 21, secured to a tungsten wire, 22, extending between the inner tubes of the filament. Expansion coils, 23 and 24, in the main supporting wire, 22, and the filament leads, 25, wire or filament in tension. The wire, 22, may be secured by and secured by lacing, 27."

No. 149,422. By J. A. FLEMING.

The specification describes a new type of a thermionic construction of which is shown on Fig. 40. The highly evacuated bulb contains the filament, B, which can be made incandescent by a

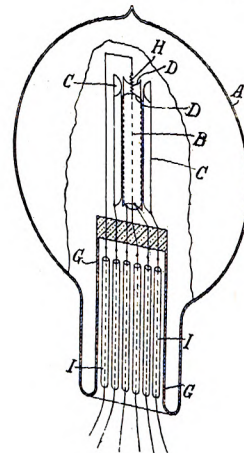


Fig. 40.

and four electrodes, C, C, D, D, in the form of segments of a cylinder to obviate the possibility of the filament touching one of the spring, H, is employed which will prevent the filament from when its temperature is raised. The application of the new detection of wireless signals is shown on Fig. 41, which is explained as follows:—

"The incidence of the waves on the aerial will produce a potential between the two plates, D, and this will produce a current through a current responsive device, F, such as a telephone magnet receiver of which the coil is connected to the collecting plates, C, and the positive end of the filament, or the receiver to the plates, C, C, by means of a transformer, decrease in the thermionic current due to the incidence of cause a sound to be heard in the telephone."

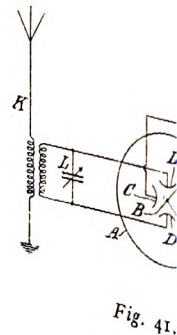


Fig. 41.

sealed ends which coincide with the extremities, 13, of the radial extensions, 12, of the grid mounting ring, 11, and are fused with these extensions to the inner wall of the bulb, at 13."

"It will be seen that the concentricity of the various electrodes is ensured. The connections from the grid and anode are brought out through the usual seals, 19 and 20."

"In a modification, the grid supporting ring extensions, 12, and the sleeves, 18, may be fused together prior to insertion into and fusion to the bulb, 1."

"The filament may be supported intermediate of its ends by a molybdenum or tungsten wire loop, 21, secured to a molybdenum or tungsten wire, 22, extending between the inner tubes of the seals, 3, to prevent sagging of the filament. Expansion coils, 23 and 24, may be inserted in the main supporting wire, 22, and the filament leads, 25, to maintain the wire or filament in tension. The wire, 22, may be secured between horns, 26, and secured by lacing, 27."

No. 149,422. By J. A. FLEMING.

The specification describes a new type of a thermionic valve, the construction of which is shown on Fig. 40. The highly evacuated bulb, A, contains the filament, B, which can be made incandescent by a source of current

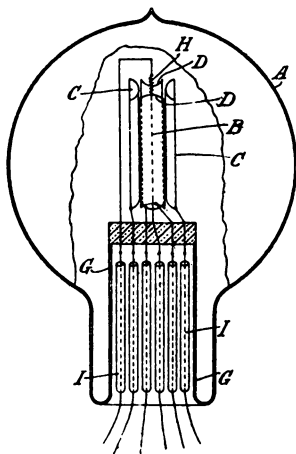


Fig. 40.

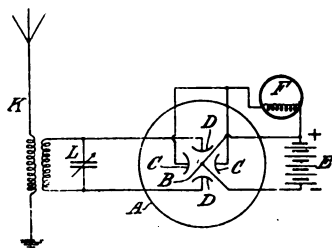


Fig. 41.

and four electrodes, C,C,D,D, in the form of segments of a cylinder. In order to obviate the possibility of the filament touching one of the electrodes a spring, H, is employed which will prevent the filament from becoming slack when its temperature is raised. The application of the new valves to the detection of wireless signals is shown on Fig. 41, which is explained by the inventor as follows:—

"The incidence of the waves on the aerial will produce a difference of potential between the two plates, D, and this will cause the thermionic current through a current responsive device, F, such as a galvanometer to diminish. This device, F, may be a galvanometer, but preferably I employ a telephone magneto receiver of which the coil is connected directly between the collecting plates, C, and the positive end of the filament, or I may couple the receiver to the plates, C,C, by means of a transformer. The sudden decrease in the thermionic current due to the incidence of the waves will cause a sound to be heard in the telephone."

her applications, as for instance to alternating current measurements. makes the following statement:—
 "The thermionic instrument responds but also to direct or unidirectional potential plates, D,D, and that such low effect a reduction in the thermionic C,C, from the filament."

ascade for amplifying H.F. currents the highest degree of amplification in other wavelengths, even differing only little from the one favoured by the system, the amplification is considerably smaller. This is very inconvenient in practice where the same amplifier has to be used for the reception of signals transmitted on widely varying wavelengths.

According to the present invention this drawback is removed by using for the windings of the intervalve transformers a wire possessing a high specific resistance. As shown on the drawing (Fig. 42) the secondaries and primaries (P¹S¹, P²S², etc.) may be connected in series. The best results, the windings should be connected in series to capacity is the greatest possible. The transformers are illustrated on Fig. 43, being wavelengths and the ordinates stages obtained at the ends of the series, the primary of which is connected

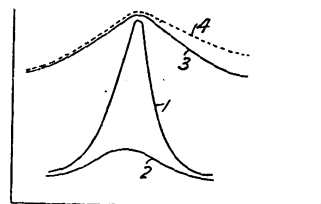


Fig. 43.

resonance point, but hardly at all at magnification still occurs. Curve 3 by employing a number of valves while curve 4 shows the effect when

possible to construct stable cascade length for waves even as short as 80

No. 149,466. By THE BRITISH THOMSON-HOUSTON CO. by G.E.C. of America.)

A well-known method of modulating the H.F. oscillation with the voice consists in the so-called "anode control," as shown in Fig. 44. Here the voltage variations caused by microphone are amplified by valve, 16, and then impressed between the plate and filament of the generating valve, 2, coupled to antenna, 1. It is obvious from the connections that generation of H.F. oscillations will take place only during that half-period of the L.F. variations when plate, 4, is made positive. During the other half-period no oscillations at all will be produced. This results in a somewhat defective articulation, the invention has for its object to remove this drawback in the manner shown in Fig. 45.

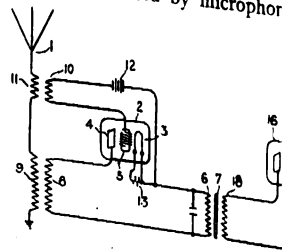


Fig. 44.

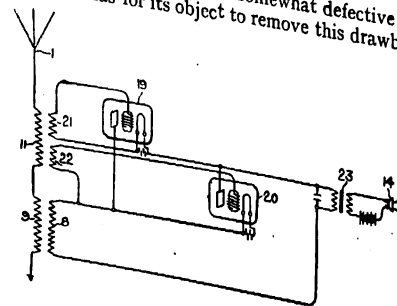


Fig. 45.

L.F. variation, for at the moment when the plate of valve, 20, is positive and *vice versa*.

No. 149,702. By W. H. ECCLES and F. W. JORDAN.
 The amplifiers involving the use of thermionic valves, giving either for one particular wavelength or for a comparatively wide range of waves. It follows that amplifiers designed for high frequencies

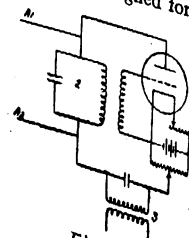


Fig. 46.

cannot be used efficiently in a direct manner for the magnification of considerably lower frequency. According to the present invention this difficulty can be eliminated by employing the H.F.

No. 149,466. By THE BRITISH THOMSON-HOUSTON Co. (Communicated by G.E.C. of America.)

A well-known method of modulating the H.F. oscillations in sympathy with the voice consists in the so-called "anode control," as illustrated in Fig. 44. Here the voltage variations caused by microphone, 14, are first amplified by valve, 16, and then impressed between plate and filament of the generating valve, 2, coupled to antenna, 1. It is obvious from the connections that generation of H.F. oscillations will take place only during that half-period of the L.F. variations when plate, 4, is made positive. During the other half-period no oscillations at all will be produced. This results in a somewhat defective articulation, and the present invention has for its object to remove this drawback in the manner indicated on Fig. 45. Here the intermediate amplifier is omitted, and two generating valves, 19 and 20, are employed. The inductance coil, 8, is common to the plate circuits of both, while separate coils, 21 and 22, are employed for each grid circuit. It will be seen that owing to the fact of the valves being in opposition, oscillations will be produced during both half-cycles of the

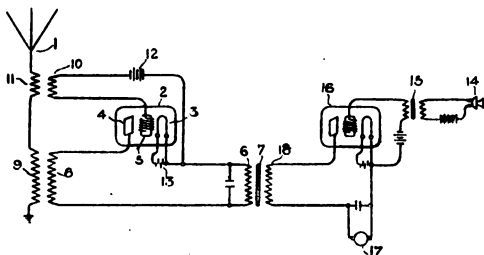


Fig. 44.

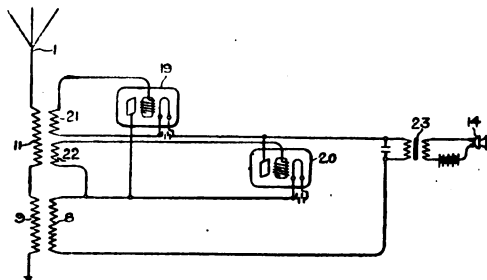


Fig. 45.

L.F. variation, for at the moment when the plate of valve, 19, is negative, that of valve, 20, is positive and *vice versa*.

No. 149,702. By W. H. ECCLES and F. W. JORDAN.

The amplifiers involving the use of thermionic valves, give best results either for one particular wavelength or for a comparatively narrow band of waves. It follows that amplifiers designed for high frequency oscillations

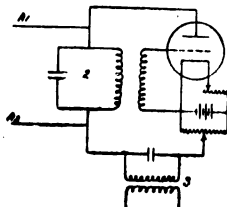


Fig. 46.

cannot be used efficiently in a direct manner for the magnification of currents of considerably lower frequency. According to the present invention this difficulty can be eliminated by employing the H.F. currents for which the

RR

mediate link. The low frequency currents impressed on the H.F. oscillations in order to be amplified currents are then rectified and re separated in some other manner. It is employed essentially the same as in wireless telephony. The wave is not used for transmission, but for reception. One method of carrying out the above is explained by the inventors as follows:

Each of the three-electrode tube, 1, generates an oscillatory circuit, 2, the voltage applied to the filament battery. Speech currents are carried by means of the transformer, 3, and the output from terminals, A¹, A², to an amplifier in use."

BRITISH PATENT SPECIFICATIONS PUBLISHED DURING 1920

Specification No.	Date of Application.	No. of Application.	Name of Inventor.	Subject-matter.
124,721	28/2/19	5,047/19	H. P. Donle, Connecticut Telephone & Elec. Co.	Valve with external
125,084	4/4/19	8,580/19	A. Blondel	Oscillograph for wireless
125,575	18/6/19	15,342/19	J. Bethenod	H.F. alternator
130,800	28/7/19	18,674/19	E. M. C. Tigerstedt	Diaphragms for tele
130,814	30/7/19	18,933/19	J. Bethenod	H.F. alternator
130,965	28/5/19	13,510/19	H. P. Donle, Connecticut Telephone & Elec. Co.	Valve with external
133,704	10/10/19	24,789/19	E. M. C. Tigerstedt	Secret telegraphy and
134,832	30/10/19	26,699/19	Siemens & Halske	Valve amplifiers
134,885	13/8/18	13,167/18	S. G. Brown	Variable resistance
135,177	7/11/19	27,530/19	Siemens & Halske	Receiving system
135,185	10/11/19	27,771/19	Westinghouse Lamp Co.	Arc generators
135,484	11/9/19	22,391/19	V. Bouchardon	Transmission system
135,825	24/10/19	26,166/19	E. F. W. Alexanderson, G.E.C. of America	H.F. alternators
135,895	5/5/19	18,072/18	P. P. Eckersley	Simultaneous transmission
135,896	4/11/18	18,076/18	J. Erskine-Murray and J. Robinson	Wireless direction-finding
135,932	3/12/18	20,004/18	R. C. Clinker, B.T.-H. Co., Ltd.	Wireless receiving system
136,059	25/3/19	7,498/19	A. Taylor and W. J. Mellersh-Jackson	Arc generators: mechanical
136,147	27/10/19	26,356/19	E. F. W. Alexanderson, G.E.C. of America	H.F. alternators
136,162	3/12/19	30,207/19	Nederlandsche Thermophoneon Maatschappij	Thermic telephone system
136,182	15/11/17	16,793/17	R. Appleyard	Apparatus for ascending and descending movements
136,359	29/1/19	2,269/19	B. S. Cohen	Microphone transmitter
136,524	5/7/19	16,905/19	H. J. J. M. Bellescize	Duplex wireless telegraph
136,600	9/12/18	20,396/18	J. Erskine Murray and W. E. Barber	Radiogoniometer
136,654	20/12/18	21,417/18	Western Elec. Co., Ltd.	Automatic switching
136,712	19/2/19	4,749/19	P. O. Pedersen	Selective filters
136,782	29/5/19	13,655/19	B. Ames and P. J. Gillingham	Arc-generators
137,003	29/5/19	13,667/19	L. B. Turner and R. H. Wagner	Condensers
137,098	24/12/18	21,667/18	J. Gardner	Wireless telegraph transmitters
137,433	22/3/19	7,148/19	J. H. Rogers	Relays
137,511	20/11/19	28,880/19	F. J. Brougham	Aerials for submarine
137,564	19/12/18	21,285/18	G. F. Partridge and B. S. Smith	Production of H.F. electrical
137,576	13/11/18	18,626/18	F. J. Hooper	Valve amplifiers
138,212	24/3/19	7,316/19	M. Latour	Controlling speed of air
138,333	19/10/18	17,120/18	Marconi's W/T Co. of America, R. A. Weagant	Automatic alarm device
138,556	22/5/19	12,925/19	Marconi's W/T Co. of America, R. A. Weagant	vacuum tube relays
138,588	6/8/19	19,389/19	Marconi's W/T Co. of America, R. A. Weagant	Apparatus for eliminating
138,745	20/3/19	6,951/19	G.E.C. of America, and B.T.-H. Co., Ltd.	Apparatus for eliminating
138,840	26/3/19	7,598/19	E. A. Bayles, H. Higham and Brit. Insulated & Helsby Cables, Ltd.	Generating valves
138,894	23/5/19	12,955/19		Condensers

BRITISH PATENT SPECIFICATIONS PUBLISHED DURING 1920

Specifi- cation No.	Date of Applica- tion.	No. of Applica- tion.	Name of Inventor.	Subject.
124,721	28/2/19	5,047/19	H. P. Donle, Connecticut Telephone & Elec. Co.	Valve with external electrodes
125,064	4/4/19	8,580/19	A. Blondel	Oscillograph for wireless telegraphy
128,575	18/6/19	15,342/19	J. Bethenod	H.F. alternator
130,800	28/7/19	18,674/19	E. M. C. Tigerstedt	Diaphragms for telephones
130,814	30/7/19	18,933/19	J. Bethenod	H.F. alternator
130,965	28/5/19	13,510/19	H. P. Donle, Connecticut Telephone & Elec. Co.	Valve with external electrodes
133,704	10/10/19	24,789/19	E. M. C. Tigerstedt	Secret telegraphy and telephony
134,832	30/10/19	26,699/19	Siemens & Halske	Valve amplifiers
134,865	13/8/18	13,167/18	S. G. Brown	Variable resistance
135,177	7/11/19	27,530/19	Siemens & Halske	Receiving system
135,185	10/11/19	27,771/19	Westinghouse Lamp Co.	Arc generators
135,464	11/9/19	22,391/19	V. Bouchardon	Transmission system
135,825	24/10/19	26,166/19	E. F. W. Alexanderson, G.E.C. of America	H.F. alternators
135,895	5/5/19	18,072/18	P. P. Eckersley	Simultaneous transmission and recep- tion
135,896	4/11/18	18,076/18	J. Erskine-Murray and J. Robinson	Wireless direction-finding
135,932	3/12/18	20,004/18	R. C. Clinker, B.T.-H. Co., Ltd.	Wireless receiving gear
136,059	25/3/19	7,498/19	A. Taylor and W. J. Mellersh-Jackson	Arc generators : method of signalling
136,147	27/10/19	26,356/19	E. F. W. Alexanderson, G.E.C. of America	H.F. alternators
136,162	3/12/19	30,207/19	Nederlandsche Thermo-Telefoon Maatschappij	Thermic telephone system
136,182	15/11/17	16,793/17	R. Appleyard	Apparatus for ascertaining logarithmic decrement of damped oscillatory movements
136,359	29/1/19	2,269/19	B. S. Cohen	Microphone transmitters
136,524	5/7/19	16,905/19	H. J. J. M. Bellescize	Duplex wireless telegraphy
136,600	9/12/18	20,396/18	J. Erskine Murray and J. Robinson	Radiogoniometer
136,654	20/12/18	21,417/18	W. E. Barber	Automatic switching over from transmission to reception, and <i>vice versa</i>
136,712	19/2/19	4,149/19	Western Elec. Co., Ltd.	Selective filters
136,762	29/5/19	13,655/19	P. O. Pedersen	Arc-generators
137,003	29/5/19	13,667/19	B. Ames and P. J. Gilinson	Condensers
137,008	24/12/18	21,667/18	L. B. Turner and R. H. Wagner	Wireless telegraph transmitters
137,433	22/3/19	7,148/19	J. Gardner	Relays
137,511	20/11/19	28,880/19	J. H. Rogers	Aerials for submarines
137,564	19/12/18	11,285/18	F. J. Brougham	Production of H.F. electric currents
137,576	13/11/18	18,626/18	G. F. Partridge and B. S. Smith	Valve amplifiers
138,212	24/3/19	7,316/19	F. J. Hooper	Controlling speed of aircraft generators
138,363	19/10/18	17,120/18	M. Latour	Automatic alarm device for use with vacuum tube relays when filament breaks
138,526	22/5/19	12,925/19	Marconi's W/T Co. of America, R. A. Weagant	Apparatus for eliminating X's
138,588	6/8/19	19,389/19	Marconi's W/T Co. of America, R. A. Weagant	Apparatus for eliminating X's
138,745	29/5/19	6,951/19	Western Elec. Co., Ltd.	Apparatus for producing vacua
138,840	26/3/19	7,598/19	G.E.C. of America, and B.T.-H. Co., Ltd.	Generating valves
138,894	23/5/19	12,955/19	E. A. Bayles, H. Higham and Brit. Insulated & Helsby Cables, Ltd.	Condensers

of Inventor.	Subject.
in	Valves
er	Vacuum-tube relays
hard	Holders for crystals
.. ..	Vacuum-tube relays for land lines
.. ..	Vacuum-tube relays for land lines
America and Co., Ltd.	Electrodes for vacuum tubes
l	Manipulating key: means for preventing sparking at contacts
.. ..	Vacuum-tube relays for land lines
.. ..	Multi-aerial transmission system
.. ..	H.F. alternator
.. ..	Crystal detectors in combination with valves
.. ..	Direction finding
.. ..	Receiving system
America and Co., Ltd.	Duplex wireless telephony
le	H.F. commutator
ndler	Direction finding apparatus
er, Dubilier Con- Co., Ltd.	Condensers
ington	Vacuum-tube relays
America and Co., Ltd.	Apparatus for automatically removing gases from vacuum tubes
ipwith, H. A. and H. Morris-	Arc transmitters
America and Co., Ltd.	Grids for valves
ner	Vacuum-tube relays
lec. Co., Ltd.	Frequency charging by means of modulation
lec. Co., Ltd.	Production and selection of harmonics by means of valves
America and Co., Ltd.	Aerials
l	Wireless telegraphy and telephony without aerials
lec. Co., Ltd.	Vacuum-tube relays for land-lines
.. ..	Reduction of speech distortion in wireless telephony
od	Direction-finding
ke	Directive Wireless Telegraphy
amond	Secret system of wireless telegraphy and telephony
.. ..	Secret system of wireless telegraphy and telephony
lec. Co., Ltd.	Selective signalling
America and Co., Ltd.	Vacuum-tubes
America and Co., Ltd.	Aerials
ock and A.	Improvements relating to apparatus useful as relay, oscillograph, telegraph and telephone
America and Co., Ltd.	Wireless signalling system
.. ..	Inductances
.. ..	Transmission of sound waves by means of light
wistle	Arc-generators
on and R. M.	Vacuum-tubes for land-lines
y	Condensers
lec. Co., Ltd.	Multiplex "wired wireless"
rsley	Means for transmitting and receiving on the same aerial
rsley	Valve generators
agart	Vacuum-tube rectifiers
ck and F. A.	Receiving apparatus

Specifi- cation No.	Date of Applica- tion.	No. of Applica- tion.	Name of Inventor.	
147,252	5/4/19	8,619/19	B. Hesketh	Thermionic
147,320	24/5/19	13,135/19	N. Lea and J. Ree	Continuous-w
148,582	21/6/18	10,289/18	W. H. Eccles and F. W. Jordan	Ionic relays
148,586	29/1/19	2,243/19	S. Oulianine	"Tone-filter"
148,632	28/4/19	10,532/19	H. J. Round	Automatic s
148,679	27/6/19	16,228/19	H. L. Crowther	transmission
149,018	20/3/18	4,943/18	W. H. Eccles and W. F. Jordan	vice versa bi
149,066	6/5/19	11,327/19	H. J. Round and G. M. Wright	Transformer f
149,076	8/5/19	11,578/19	S. R. Mullard	Valve generat
149,409	9/5/19	11,661/19	G.E.C. of America	Direction findi
149,422	12/5/19	11,873/19	B.T.H. Co., Ltd.	Construction c
149,433	13/5/19	12,005/19	J. A. Fleming	Continuous-w
149,434	13/5/19	12,006/19	H. J. Round	Valve with fou
149,435	13/5/19	12,008/19	H. J. Round	Thermionic re
149,466	28/5/19	13,479/19	G.E.C. of America	Thermionic re
149,532	5/9/19	21,841/19	B.T.H. Co., Ltd.	Receiving dev
149,702	21/6/18	10,299/18	J. Hollingworth	Modulating wi
149,826	4/7/19	16,769/19	W. H. Eccles and F. W. Jordan	Loop aerials
149,827	4/7/19	16,770/19	J. Erskine-Murray	Ionic relays
150,008	7/3/19	5,667/19	J. Erskine-Murray, J. Robinson and H. L. Crowther	Direction findi
150,025	14/5/19	12,173/19	M. Compare, Compari	Direction findi
150,037	21/5/19	12,821/19	Wireless Control Syndicate, Ltd.	Secret telegra
150,096	6/6/19	14,422/19	D. McLennan, Creed & Co., Ltd.	Recorders
150,359	1/8/16	10,850/16	H. J. Round	Wireless telep
150,415	29/5/19	13,634/19	R. W. Winn	transmission
150,516	9/8/19	19,613/19	G.E.C. of America	Variable conde
150,798	5/6/19	14,309/19	B.T.H. Co., Ltd.	Construction o
150,907	30/9/19	23,979/19	R. Whiddington	Cascade arrang
151,021	27/10/16	15,358/16	G.E.C. of America	Thermionic val
151,050	20/5/19	12,727/19	P. L. Douvry	Duplex receiv
151,063	12/6/19	14,825/19	B.T.H. Co., Ltd.	Portable wirele
151,115	2/7/19	16,478/19	J. W. Robinson	Means for elimi
151,138	31/7/19	18,989/19	C. T. Wilkinson	Automatic tran
151,346	20/6/19	15,536/19	L. A. McDougald and H. M. Poyntz	device
151,389	4/7/19	16,771/19	H. W. Sullivan and J. Joseph	Aerial system
151,462	12/9/19	22,494/19	G.E.C. of America	Aerial system f
			B.T.H. Co., Ltd.	Variable conden
			J. Robinson and J. Erskine-Murray	Valve amplifiers
			G.E.C. of America	Direction findi
			Trippe	Thermionic valv

NOTE.—The above list of British patents includes those published between 1st January and October 21st, 1920.

BRITISH PATENT SPECIFICATIONS PUBLISHED DURING 1920 (continued).

Patent No.	Date of Application.	No. of Application.	Name of Inventor.	Subject.
252	5/4/19	8,619/19	B. Hesketh	Thermionic valves
320	24/5/19	13,135/19	N. Lea and J. Ree ..	Continuous-wave transmitters
582	21/6/18	10,289/18	W. H. Eccles and F. W. Jordan	Ionic relays
586	29/1/19	2,243/19	S. Oulianine	"Tone-filter" or mechanical relay
832	28/4/19	10,532/19	H. J. Round	Automatic switching over from transmission to reception and vice versa by the voice
879	27/6/19	16,228/19	H. L. Crowther	Transformer for valves
918	20/3/18	4,943/18	W. H. Eccles and W. F. Jordan	Valve generating system
966	6/5/19	11,327/19	H. J. Round and G. M. Wright	Direction finding
976	8/5/19	11,578/19	S. R. Mullard	Construction of valves
409	9/5/19	11,661/19	G.E.C. of America and B.T.-H. Co., Ltd.	Continuous-wave transmitters
422	12/5/19	11,873/19	J. A. Fleming	Valve with four plates
433	13/5/19	12,005/19	H. J. Round	Thermionic receiving device
434	13/5/19	12,006/19	H. J. Round	Thermionic receiving device
435	13/5/19	12,008/19	H. J. Round	Receiving device
466	28/5/19	13,479/19	G.E.C. of America and B.T.-H. Co., Ltd.	Modulating with valves
532	5/9/19	21,841/19	J. Hollingworth ..	Loop aeriels
702	21/6/18	10,290/18	W. H. Eccles and F. W. Jordan	Ionic relays
826	4/7/19	16,769/19	J. Erskine-Murray ..	Direction finding
827	4/7/19	16,770/19	J. Erskine-Murray, J. Robinson and H. L. Crowther	Direction finding
008	7/3/19	5,667/19	M. Compare, Comparri Wireless Control Syndicate, Ltd.	Secret telegraphy and telephony
025	14/5/19	12,173/19	D. McLennan, Creed & Co., Ltd.	Recorders
037	21/5/19	12,821/19	H. J. Round	Wireless telegraph and telephone transmission
096	6/6/19	14,422/19	R. W. Winn	Variable condensers
359	1/8/16	10,850/16	G.E.C. of America and B.T.-H. Co., Ltd.	Construction of thermionic valves
415	29/5/19	13,634/19	G.E.C. of America and B.T.-H. Co., Ltd.	Cascade arrangement of valves
516	9/8/19	19,613/19	R. Whiddington ..	Thermionic valves
798	5/6/19	14,309/19	G.E.C. of America and B.T.-H. Co., Ltd.	Duplex receiving system
807	30/9/19	23,979/19	P. L. Douvry	Portable wireless telephone
821	27/10/16	15,358/16	G.E.C. of America and B.T.-H. Co., Ltd.	Means for eliminating atmospherics
850	20/5/19	12,727/19	J. W. Robinson ..	Automatic transmitting and receiving device
863	12/6/19	14,825/19	C. T. Wilkinson ..	Aerial system
115	2/7/19	16,478/19	L. A. McDougald and J. M. Poyntz	Aerial system for aircraft stations
138	31/7/19	18,989/19	H. W. Sullivan and J. Joseph	Variable condensers
146	20/6/19	15,556/19	G.E.C. of America and B.T.-H. Co., Ltd.	Valve amplifiers
189	4/7/19	16,771/19	J. Robinson and J. Erskine-Murray	Direction finding
192	12/9/19	22,494/19	G.E.Co., Ltd., and C. F. Trippe	Thermionic valves

NOTE.—The above list of British patents includes those published between January 1st and October 21st, 1920.

SPECIFICATIONS NG 1920

H., 139,694
H., 140,227
North, J., 149,532
F. J., 138,212
A., 144,761, 146,747
F. W., 148,582, 149,018, 149,702
J., 151,138

M., 138,383, 140,123, 140,133, 140,506.
,937
,147,320
, 143,583

ald, L. A., 151,115
an, D., 150,025
H. A., 142,141
's Wireless Telegraph Co., of America,
586, 138,588
-Jackson, W. J., 136,059
lirey, H., 142,141
S. R., 149,076

dsche Thermo-Telephon Maatschappij,
,162

e, S., 148,586

a, G. F., 137,876
P. O., 136,762
J. M., 151,115

K., 144,761, 146,747
147,320
n, J., 135,896, 136,600, 141,190, 149,827,
389
n, J. W., 151,050
n, C., 145,869
J. H., 137,511
H. J., 148,632, 149,066, 149,433, 149,434,
435, 150,037
P., 141,269

ggart, J., 146,708
& Halske, 134,832, 135,177
H. L., 142,141
I. S., 137,876
H. W., 151,138

A., 136,059
it, E. M. C., 130,600, 133,704
J. F., 151,462
L. B., 137,098, 139,867, 142,333

R. H., 137,098
R. A., 138,586, 138,588
Electric Co., Ltd., 136,712, 138,745,
371, 142,571, 143,509, 143,625, 146,562
house Lamp Co., 135,185
uton, R., 141,900, 150,516
n, C. T., 151,063
W., 150,096
G. M., 149,066

U.S.A. PATENT SPECIFICAT PUBLISHED DURING 1920

Specifi- cation No.	Date of Appli- cation.	Patentee.	Assignee.	
1,328,574	11/9/15	H. W. Nichols ..	Western Elec. Co. ..	Secret sign
1,328,865	20/5/16	H. E. Shreeve ..	Western Elec. Co. ..	Vacuum-t
1,328,787	30/4/12	J. H. Hammond ..	—	Selective t
1,327,593	11/4/19	W. Dubilier ..	—	Series con
1,328,041	15/8/13	K. Fischer ..	—	Relays
1,328,288	20/12/17	A. Marino ..	Siemens Schuckert- werke G.M.B.H.	Quenched
1,328,610	21/1/16	E. F. W. Alex- anderson ..	G.E. Co. ..	Means to
1,328,925	20/8/19	F. Kratz ..	R. Bosch A.-G.	currents
1,328,933	21/8/17	R. E. Thompson ..	—	Condenser
1,329,333	30/7/18	H. Arnold ..	Western Elec. Co. ..	Receiving
1,329,672	29/11/16	E. C. Mignon ..	De Forest ..	Valve amp
1,328,768	16/6/16	L. de Forest ..	Telephone ..	Receiving
1,329,761	13/7/17	E. G. Gage ..	Radio ..	Oscillating
1,330,182	20/7/16	H. E. Hallborg ..	—	Electrolyti
1,330,264	23/4/17	L. F. Fuller ..	Federal ..	Spark-gap
1,330,471	29/11/15	B. W. Kendall ..	Co. ..	Method of
1,330,935	29/6/18	F. P. Driver ..	Western Elec. Co. ..	transmit
1,331,008	2/7/19	W. G. H. Finch ..	Osram ..	H. F. signal
1,333,085	1/8/18	C. H. Roe ..	Lamp Works, Ltd.	Means for
1,333,376	20/6/18	M. Berel and L. Funke ..	—	in ionic
1,333,789	15/10/15	J. Bethenod and E. Girardese ..	—	Recorder
1,334,067	23/3/18	A. N. Goldsmith and J. Wein- berger ..	—	Transmissi
1,334,118	31/7/17	C. W. Rice ..	G.E. Co. ..	without
1,334,139	1/8/18	W. Dubilier ..	—	Oscillation
1,334,140	1/8/18	W. Dubilier ..	—	Spark-gap
1,334,142	11/4/19	W. Dubilier ..	G.E. Co. ..	Generating
1,334,150	11/7/16	C. E. Green and J. H. Clough ..	—	Amplifying
1,334,165	17/9/15	M. I. Pupin and E. H. Armstrong ..	G.E. Co. ..	Condenser
1,336,378	1/10/15	E. H. Armstrong ..	—	Condenser
1,336,398	1/2/18	L. F. Fuller ..	—	Condenser
1,336,833	21/5/17	Radio Corporation ..	—	Discharge-t
1,337,245	19/11/19	B. Macpherson ..	Federal ..	Production
1,337,248	19/11/19	B. Macpherson ..	Co. ..	ance an
1,337,605	13/12/17	W. C. Brinton ..	Mica Condenser Co. ..	Receiving
1,337,649	4/11/19	R. J. Fitzgerald ..	—	tributed p
1,337,787	30/9/18	F. J. van der Bijl ..	—	Elimination
1,337,933	27/1/16	G. M. J. Mackay ..	—	Are transmi
1,338,756	28/4/16	F. E. Summers ..	G.E. Co. ..	Re-healing
1,338,889	1/2/16	R. A. Weagant ..	—	densers
1,338,984	7/10/18	G. Hill ..	Radio Corporation ..	Building stan
				Condenser
				Producing cu
				wave form
				Electric oscill
				Receivers
				Thermionic va
				Combined w
				wavemeter

U.S.A. PATENT SPECIFICATIONS PUBLISHED DURING 1920

Patent No.	Date of Application.	Patentee.	Assignee.	Subject.
74	11/9/15	H. W. Nichols ..	Western Elec. Co. ..	Secret signalling system
85	20/5/16	H. E. Shreeve ..	Western Elec. Co. ..	Vacuum-tube socket
727	30/4/12	J. H. Hammond ..	—	Selective transmission system
593	11/4/19	W. Dubilier ..	—	Series condenser
941	15/8/13	K. Fischer ..	Siemens Schuckert- werke G.M.B.H.	Relays
288	20/12/17	A. Marino ..	—	Quenched spark-gaps
110	21/1/16	E. F. W. Alexander ..	G.E. Co. ..	Means for controlling H.F. currents
925	20/8/19	F. Kratz ..	R. Bosch A.-G. ..	Condenser
933	21/8/17	R. E. Thompson ..	—	Receiving apparatus
283	30/7/18	H. Arnold ..	Western Elec. Co. ..	Valve amplifier
372	29/11/16	E. C. Mignon ..	—	Receiving system
758	16/6/16	L. de Forest ..	De Forest Radio and Telephone Telegraph Co.	Oscillating-current generator
761	13/7/17	E. G. Gage ..	—	Electrolytic oscillator
182	20/7/16	H. E. Hallborg ..	—	Spark-gap
254	23/4/17	L. F. Fuller ..	Federal Telegraph Co.	Method of signalling with arc transmitters
471	29/11/15	B. W. Kendall ..	Western Elec. Co. ..	H.F. signalling
935	29/6/18	F. P. Driver ..	Osram Robertson Lamp Works, Ltd.	Means for supporting electrodes in ionic tubes
98	2/7/19	W. G. H. Finch ..	—	Recorder
95	1/8/18	C. H. Roe ..	—	Transmission of electrical power without wires
176	20/6/18	M. Berel and L. Funke ..	—	Oscillation generator
89	15/10/15	J. Bethenod and E. Girardeau ..	—	Spark-gap
87	23/3/18	A. N. Goldsmith and J. Weinberger ..	G.E. Co. ..	Generating valves
18	31/7/17	C. W. Rice ..	G.E. Co. ..	Amplifying valves
39	1/8/18	W. Dubilier ..	—	Condenser
40	1/8/18	W. Dubilier ..	—	Condenser
42	11/4/19	W. Dubilier ..	—	Condenser
50	11/7/16	C. E. Green and J. H. Clough ..	G.E. Co. ..	Discharge-tube
65	17/9/15	M. I. Pupin and E. H. Armstrong ..	—	Production of negative resistance and elimination of atmospherics
78	1/10/15	M. I. Pupin and E. H. Armstrong ..	—	Receiving aerials with distributed positive resistance
98	1/2/18	R. A. Weagant ..	Radio Corporation ..	Elimination of atmospherics
33	21/5/17	L. F. Fuller ..	Federal Telegraph Co.	Arc transmitter
45	19/11/19	B. Macpherson ..	Mica Condenser Co. ..	Re-healing process for condensers
46	19/11/19	B. Macpherson ..	Mica Condenser Co. ..	Building stand for condensers
55	13/12/17	W. C. Brinton ..	Philips Brinton Co. ..	Condenser
19	4/11/19	R. J. Fitzgerald ..	A. Fischer ..	Condenser
37	30/9/18	F. J. van der Bijl ..	Western Elec. Co. ..	Producing currents of desired wave form
38	27/1/16	G. M. J. Mackay ..	G.E. Co. ..	Electric oscillator
46	28/4/16	F. E. Summers ..	—	Receivers
19	1/2/16	R. A. Weagant ..	Radio Corporation ..	Thermionic valves
14	7/10/18	G. Hill ..	—	Combined wave-changer and wavemeter

Subject.
Arc transmitters
Transmitting apparatus
System of ether-wave contro
Means for controlling electrical energy
Valve-generator
Electroionic valve
Resonant converter
Thermionic valves
Modulation of H.F. currents
Wireless telephony
Condensers
Direction finding
Thermionic valves
Method of receiving H.F. oscillations
Submarine radio system
Means for supporting electrodes in ionic tubes
Control means for vacuum-tube circuits
Arc transmitters
Elimination of atmospherics
Wave-changer
Transmitting apparatus
Radiophone
Condenser
Condenser
Radio-signalling system
Apparatus for propagating and intensifying electrical oscillations
Apparatus for amplifying electric oscillations
Radiotelephone system
Radio conductors
Radio conductors
Modulating and transmitting system
Condenser
Condenser
Elimination of atmospherics
Adjustable condenser
Arc transmitters
Radiotelegraphy
Duplex system
Duplex system
Condenser
Oscillation-generator system
Condenser
Arc transmitter
Aerials for receiving
Arc transmitters
Arc transmitters
Elimination of atmospherics
Combined carrier and radio system
Antenna structure

U.S.A. PATENT SPECIFICATIONS PUBLISHED DURING 1920

Speci- fication No.	Date of Appli- cation.	Patentee.	Assignee.
1,353,976	20/3/16	E. R. Stoekle	Western Elec. Co. .. Vacuum
1,354,146	25/2/19	P. Thomas	Westinghouse Electric and Mfg. Co. Condense
1,354,147	7/3/19	P. Thomas	Westinghouse Electric and Mfg. Co. Condense
1,354,280	19/6/20	E. E. Frankis	Radio Corporation .. Receivers
1,354,312	25/11/16	M. Latour	—
1,354,939	30/9/18	H. D. Arnold	Western Elec. Co. .. Generator oscillat
1,355,488	6/7/20	M. Compare	— Vacuum t
1,355,686	30/12/16	H. D. Arnold	— Wireless c
1,355,751	12/7/18	R. A. Weagant	Radio Corporation .. Secret sig
1,355,752	12/7/18	F. N. Waterman and R. A. Weagant	Radio Corporation .. Eliminatio
1,355,763	1/6/15	R. V. L. Hartley	Radio Corporation .. Eliminatio
1,357,210	16/12/19	J. Robinson	Western Elec. Co. .. Oscillation Direction

NOTE.—The above list of U.S.A. patents includes those published December 17th, 1919, and October 26th, 1920.

U.S.A. PATENT SPECIFICATIONS PUBLISHED DURING 1920 (continued).

Speci- fication No.	Date of Appli- cation.	Patentee.	Assignee.	Subject.
1,353,976	20/3/16	E. R. Stoekle ..	Western Elec. Co. ..	Vacuum-tubes
1,354,146	25/2/19	P. Thomas ..	Westinghouse Electric and Mng. Co.	Condenser
1,354,147	7/3/19	P. Thomas ..	Westinghouse Electric and Mng. Co.	Condenser
1,354,290	19/6/20	E. E. Frankis ..	Radio Corporation ..	Receivers
1,354,312	25/11/16	M. Latour ..	—	Generator of sustained oscillations
1,354,939	30/9/18	H. D. Arnold ..	Western Elec. Co. ..	Vacuum-tubes
1,356,488	6/7/20	M. Compare ..	—	Wireless control system
1,356,696	30/12/16	H. D. Arnold ..	Western Elec. Co. ..	Secret signalling
1,356,751	12/7/18	R. A. Weagant ..	Radio Corporation ..	Elimination of atmospherics
1,356,752	12/7/18	F. N. Waterman and R. A. Weagant	Radio Corporation ..	Elimination of atmospherics
1,356,763	1/6/15	R. V. L. Hartley	Western Elec. Co. ..	Oscillation-generator
1,357,210	16/12/19	J. Robinson ..	—	Direction finding

NOTE.—The above list of U.S.A. patents includes those published between December 17th, 1919, and October 26th, 1920.

NAME INDEX TO U.S.A. PATENT SPECIFICATIONS PUBLISHED DURING 1920

- Afel, H. A.**, 1,353,698
Alexanderson, E. F. W., 1,328,610, 1,340,101, 1,350,911, 1,350,912
American Telephone & Telegraph Company, 1,353,698, 1,353,735
Armstrong, E. H., 1,334,165, 1,336,378, 1,342,885
Arnold, H. D., 1,329,283, 1,354,939, 1,356,686
Babcock, C. D., 1,341,006
Bayles, E. A., 1,346,694
Beal, R. E., 1,350,695
Beral, M., 1,333,376
Bothenod, J., 1,333,789
Berg, E. J., 1,352,242
Bijl, F. J. van der, 1,337,737
Bosch, A.-G. R., 1,326,925
Brinton, W. C., 1,337,505
Callaghan, H. J., 1,347,440
Callaghan, J. J., 1,347,440
Clough, J. H., 1,334,150
Coblentz, W. W., 1,345,586
Compare, M., 1,356,488
Cutler-Hammer Mfg. Co., 1,340,575
Cutting, F., 1,345,352
de Forest, L., 1,329,758, 1,348,157, 1,348,213
de Forest Radio Telephone & Telegraph Co., 1,329,758, 1,348,157, 1,348,213
Driver, F. P., 1,330,935
Dubilier, W., 1,327,593, 1,334,139, 1,334,140, 1,334,142, 1,345,754, 1,350,010
Durdle, O., 1,343,551
Elliott, H. F., 1,352,883
Erskine-Murray, J., 1,342,257
Espenschied, L., 1,353,735
Federal Telegraph Co., 1,330,254, 1,336,833, 1,339,191, 1,344,052, 1,350,695, 1,352,059, 1,352,886
Finch, W. G. H., 1,331,098
Fischer, A., 1,337,549
Fischer, K., 1,328,041
Fitzgerald, R. J., 1,337,549
Frankis, E. E., 1,354,290
Fuller, L. F., 1,330,254, 1,336,833, 1,339,191, 1,344,052, 1,352,059, 1,352,886
Funk, L., 1,333,376
Gage, E. G., 1,329,761
General Electric Co., 1,328,610, 1,334,087, 1,334,118, 1,334,150, 1,337,933, 1,340,101, 1,347,328, 1,349,792, 1,350,911, 1,350,912, 1,352,242
Girardeau, E., 1,333,789
Goldsmith, A. N., 1,334,087, 1,347,328
Green, C. E., 1,334,150
Hallborg, H. E., 1,330,182
Hammond, J. H., 1,326,727, 1,339,927, 1,350,801
Hanson, E. C., 1,341,232
Hartley, R. V. L., 1,356,763
Heising, R. A., 1,341,211, 1,343,562
Higham, H., 1,346,694
Hill, G., 1,338,984, 1,345,007
Hogan, J. L., 1,350,100
Howe, P. J., 1,350,279
International Radio Telegraph Co., 1,350,100
Kendall, B. W., 1,330,471
Kent, A. W., 1,351,787
Kratz, F., 1,328,925
Latour, M., 1,354,312
Lemmon, W. S., 1,340,963
Logwood, C. V., 1,351,776
Lowenstein, F., 1,339,772
Mackay, G. M. J., 1,337,933
Macpherson, B., 1,337,245, 1,337,246, 1,341,336
McCaa, D. G., 1,344,275
Marino, A., 1,328,288
Marx, R. A., 1,344,052
Mica Condenser Co., 1,337,245, 1,337,246, 1,341,336
Mignon, E. C., 1,329,672
Nelson, J., 1,341,006
Nelson, E. L., 1,349,729
Nichols, H. W., 1,325,574
Osram Robertson Lamp Works, Ltd., 1,330,935, 1,343,551
Philips-Brinton Co., 1,337,505
Pupin, M. L., 1,334,165, 1,336,378
Radio Corporation of America, 1,336,398, 1,338,889, 1,342,399, 1,353,002, 1,354,290, 1,356,751, 1,356,752
Rice, C. W., 1,334,118
Richter, W. H., 1,351,787
Robinson, J., 1,342,257, 1,357,210
Roe, C. H., 1,333,095
Rogers, J. H., 1,349,103, 1,349,104
Shreeve, H. E., 1,325,865
Siemens Schuckert-werke, G. M. B. H., 1,328,041
Stearns, R. W., 1,349,792
Stoekle, E. R., 1,340,575, 1,353,976
Stogoff, P. E., 1,343,165
Summers, F. E., 1,338,756
Taylor, A., 1,352,883
Thomas, P., 1,351,074, 1,354,146, 1,354,147
Thompson, R. E., 1,328,933
Freeland, F. K., 1,340,193
Waterman, F. N., 1,356,752
Washington, B., 1,345,352
Weagant, E. A., 1,336,398, 1,338,889, 1,342,399, 1,353,002, 1,356,751, 1,356,752
Weinberger, J., 1,334,087
Western Electric Co., 1,325,574, 1,325,865, 1,329,283, 1,330,471, 1,337,737, 1,341,211, 1,343,562, 1,349,729, 1,353,976, 1,354,939, 1,356,686, 1,356,763
Westinghouse Electric & Manufacturing Co., 1,351,074, 1,354,146, 1,354,147
Western Union Telegraph Co., 1,350,279

AVIATION SECTION

- (A) Wireless Telephony and Commercial Aviation.**
- (B) Tabular List of Aviation Stations.**
- (C) Aircraft fitted with Wireless Telephony.**
- (D) Marking of Aircraft.**
- (E) Table of Marks.**
- (F) General Information.**

WIRELESS TELEPHONY AS APPLIED TO COMMERCIAL AVIATION

BY LIEUT. COL. H. B. T. CHILDS, A.F.R.Ae.S., A.M.I.E.E.

THE last edition of the "Year Book of Wireless Telegraphy and Telephony" contained two articles, one a very interesting account of the progress made in the application of wireless to aircraft from the early days of 1914 until the close of hostilities in 1918, contributed by Major Orme. The second article, by Major Prince, gave a lucid description of the application of wireless telephony to aircraft and its use during the war and during the period of the armistice when the wireless telephone was employed on the Folkestone-Cologne Aerial Postal Route.

In the following article it is proposed to deal with the general uses to which wireless may be put for the purpose of assisting the progress of commercial aviation.

It has been accepted as a foregone conclusion that the progress of aviation generally, particularly on organised aerial routes, goes hand in hand with the progress made in the perfecting and organising of wireless systems.

The success and efficiency of any organised aerial service depends to-day, and will depend more and more as time goes on, on a rapid and efficient means of communication both between terminal and intermediate air ports, and also between aeroplanes in flight and with ground stations situated at these air ports.

Before coming to the question of communications it is obviously necessary, in the first place, to have a very thorough meteorological service, including meteorological officers and their equipment at all terminal and intermediate air ports.

The observations recorded at each air port have to be circulated so that meteorological information recorded at various hours during the day is available at all points along the route. This is particularly essential in parts of the world where climatic conditions are liable to change from hour to hour.

To illustrate this let us assume that a service of machines is running between two points separated by a distance of 1,000 miles. Between these two terminal air ports are situated three intermediate air ports. Let us call the terminal air ports A and B, and the intermediate air ports C, D, and E. At certain hours during the day it will be necessary for A, B, C, D, or E to know exactly what the weather conditions are at any of the other stations. Machines employed on this route would presumably fly in relays, each machine doing a distance of 250 miles—goods and passengers being transhipped to another machine which would take them on to the next air port.

Very possibly, in the case of the larger machines with a capacity for carrying larger fuel supplies, the total distance would be traversed with only one relay; that is to say, each machine would skip one of the intermediate air ports, transferring its passengers and baggage at the half-way mark. In these days where large machines of this nature are capable of travelling from 100 to 110 miles per hour, the normal time for traversing this distance of roughly 500 miles would be of the order of four to five hours. The pilot's decision in every case as to whether it was deemed advisable or not to pass the intermediate air port without alighting would rest on weather reports

obtained from air ports ahead of him, or from other machines in flight. The decision arrived at would be a vital one where the country situated between the air ports was unsuitable for forced landings, or where the country was unpopulated and a forced landing might mean a delay of days before assistance could arrive, or might even lead to worse disaster attended by possible loss of life.

All this points to the fact that unless such a route has facilities for rapidly passing weather reports from one air port to the next, and further, for passing this information from the air ports to the aeroplanes in flight, the difficulties in conducting a safe and efficient service would be greatly increased.

It should be sufficiently clear therefore to the reader that the progress of long commercial flights goes hand in hand with the progress and development of communications.

It may, perhaps, be of interest to set forth a few suggestions as to how such a route might be organised, and later to give a few details of the apparatus which is at the present day available for carrying out such an organisation.

Returning to the fictitious route from A to B, with intermediate air ports at C, D, and E, it is assumed that a meteorological service has been organised, and that meteorological officers and apparatus are available at all these points. Weather reports and observations would be taken at certain fixed hours during the day and night, and such observations having been taken it is next the duty of the radio installations at the various ports to pass this information rapidly so that A, B, C, D, and E each know the others weather at certain definite times.

Past experience has gone a long way to show that wireless telephony gives the most rapid and simple means for the transmission of short messages that it is possible to get. It is thought that provided a short, concise, and easily pronounceable code is available this method is by far the quickest. A long figure code can possibly be passed more correctly by the use of the wireless telegraph and Morse Code, but quite certainly not so rapidly as using the wireless telephone. On the other hand, these types of code messages sent by wireless telephony are often received inaccurately, or with difficulty. It would appear, therefore, that the most accurate method of passing such information would be by means of the telephone, with a code which is good phonetically, and as short as possible. In any case, where the wireless telephone is employed it is advisable that all operators at ground stations should be possessed of a knowledge of shorthand.

From these observations it will be seen that the first step to be taken in organising communications is to instal radio-telephony apparatus at all five air ports.

These installations should be sufficiently powerful to be able, if necessary, to jump an intermediate station; that is to say A can communicate with D, skipping C. By this means all five stations can be in possession of each others weather conditions in not longer than half-an-hour after the meteorological observations have been taken and coded.

In countries where climatic conditions are rapidly changing it would, in all probability, be necessary to interchange these reports once every two hours or even less. Where the conditions are more stable, however, interchange every four or six hours would probably be quite

sufficient. In every case it is most essential that this interchange should be as infrequent as possible in order that the system may devote the maximum amount of time in standing-by for calls from aeroplanes in flight. Apart from the sending of weather reports it must be remembered that there will be a certain amount of traffic in the reporting of arrivals and departures of machines, details of forced landings, etc., etc.

The general organisation should be such that the ground station should be available for the reception and transmission of air traffic for at least 75 per cent. of every 24 hours.

From the foregoing remarks it will be seen that telephony is favoured, as opposed to telegraphy.

Returning to the question of the system to be employed from the air, past experience goes to show that here also the wireless telephone is by far the most simple and rapid method of communication.

It would appear from the general trend of opinion, as expressed by the various aircraft transport companies at present operating on the London-Paris, Brussels, and Amsterdam routes that simplicity is a very important factor for the aircraft telephone and telegraph set.

In these early days of aerial transport where every consideration has to be given to the saving of expense wherever possible, it has been considered that, if at all feasible, the air operator should be dispensed with, the chief reason being that where an air operator is carried a seat is taken up that would otherwise be occupied by a passenger or an equivalent weight of merchandise.

In view of these considerations it at once becomes apparent that the air telephone must be extremely easy to handle and capable of giving first-rate results under all conditions at the hands of non-technical personnel.

In the case of the small passenger-carrying machines these sets would have to be operated by the pilots, or in the case of the larger machines, which normally carry a mechanic as well as a pilot, the set would be operated by either the mechanic or pilot.

These points have been very carefully thought out in the design of the latest sets. It must be quite pleasing to the designers of this apparatus to know that a number of machines are now running on the London-Paris route, operated both by pilots and mechanics with complete success.

Allowance should also be made for operating these sets on the ground in the case of forced landings, so that a machine can get in touch with the nearest air-port in order that assistance may be sent out in the shortest possible time.

To comply with International Regulations these air sets have to be available for working on the standard 600-metre ship wave, as well as the wave set aside for air communications, viz. : 900 metres.

Facilities should further be included for working the 600-metre wave on ordinary Morse telegraphy for use in cases where an air operator is carried, or where a pilot or mechanic has a knowledge of the Morse Code.

The 600-metre wave allows for communication from the air to coast stations in cases of distress while over the water. Where the air sets are operated by personnel unacquainted with the Morse Code the telephone can be employed over limited distances, using crystal receivers on the ground.

Before passing on to a description of the installations at the air ports and in the aeroplanes, a few words regarding direction finding for aircraft may not be out of place.

Two methods of direction finding for aircraft have been employed up to date, viz. : where direction finding apparatus is installed on the ground, and, secondly, where it is carried on the aeroplane.

A certain amount of discussion has taken place as to which method is preferable, and as a matter of fact there are many pros and cons for each system. During war-time there is no doubt it is far better to carry the apparatus on the machine, by which means the navigator can employ his wireless compass, using ordinary long or short-distance ground stations for taking his bearings, there being no need for the machine to give its position away by doing any transmission. This method therefore is a secret one and does not give any information to the enemy. Under peace conditions, however, especially in the case of smaller craft, the question of the extra weight entailed does not favour the adoption of this method. The alternative system, where the apparatus is installed at the air-port stations, necessitates the aeroplane calling up the ground stations and asking for its position. Its bearings are taken by two adjacent ground stations, a "fix" worked out, and the information transmitted from the ground to the air. At first sight this method might seem a long and tedious one, but after some practice a position can be asked for and the information received in the air in the course of a minute or two. It would, therefore, seem that the following are the chief points for and against each method :—

1. *Direction Finding on Aircraft Stations.*

Advantages: (a) Secrecy; (b) Responsibility for correct position rests with the navigator on the machine.

Disadvantages: (a) Extra training and work for navigator; (b) Extra weight in carrying apparatus and navigator.

2. *Position Finding at Ground Stations.*

Advantages: (a) Saving of weight of apparatus and operator or navigator on the machine; (b) No extra personnel, or training for same required; (c) Greater accuracy due to absence of noise, magneto disturbances, etc.

Disadvantages: (a) The pilot of the machine has to rely on "fixes" given him by the ground stations; (b) Slight delay between the time of asking for position and the time it is received from the ground stations.

The writer is of the opinion that although much stress has been laid on the necessity of rapid communications between air-ports and aeroplanes in flight, the aid to navigation rendered by direction finders is no less important.

Given an organisation as briefly outlined above, with telephonic communication between adjacent air-ports and between air-ports and aeroplanes in flight, and a complete system of direction finding stations on the ground, with skilled pilots, it should be quite possible to run a successful service over long distances at any season of the year under almost any conditions of weather.

Up to the present the question of daylight flying only has been in the writer's mind. The same conditions, however, apply to night

flying, where, naturally, a complete system of light-houses and landing lights must be added.

The present London-Paris service is gradually being organised on these lines, and as soon as the wireless services on both sides of the Channel and light-house systems are complete, there should be no reason why this service should not be continuous throughout the year. The same would apply to any other route of greater length organised in like manner.

Air-Port Ground Installation.

From the foregoing remarks it will be seen that the functions of an air-port ground station are threefold: Firstly, it provides a link between aircraft in flight and the terminal and intermediate aerodromes, and from thence, *via* the land telephone network, to any desired centre; secondly, it can communicate with other aerodromes on an aerial route, thus reporting arrivals and departures, details of weather, etc.; thirdly, it is equipped with direction finding apparatus, which enables any machine to be immediately located, this location being reported direct to the pilot concerned.

Out of the two alternatives, direction finding in the machine or position finding on the ground, the needs of the present day are best fulfilled by the latter.

The ground station position finder works under far more favourable conditions, *e.g.*, better amplification, freedom from magneto noise, quietness and ease of operating, thus giving a higher degree of accuracy.

The continuous watch which should be kept on a machine flying over a route with these stations becomes a constant check of its position, so that, in emergency, the most fleeting S.O.S. is sufficient to indicate the exact location where the machine is in distress.

These considerations entail certain general conditions of design. In the first place, wireless telephony must be used for simplicity's sake, and, further, in order that a passenger in flight may speak to his business office or home arrangement must be made for the wireless energy received at the ground station to be relayed on to the ordinary local land lines. In the second place, direction finding apparatus must be installed. The direction finding aerials being unsuitable for transmission, a separate transmitting aerial must be used. In order that the accuracy of the direction finding aerials shall not be impaired, the receiving station must be placed some distance from the transmitting aerials. In order that the whole station may be under the control of one operator, some form of Remote Control must be devised so that the transmitter can be completely controlled from the receiving hut. With these objects in view, arrangements are made for combining into one the direction finding and ordinary reception of signals. This necessary arrangement brings with it other advantages, such as freedom from noise, both electrical and mechanical, while receiving, the possibility of quick exchange of messages since the running machinery need not be shut down for every received message, and neatness of arrangement of control switches, the operating board consisting of small current relay switches such as are used on telephone operators' control boards.

Speed in operating is an important factor, because a lost machine calling for position should be located by two stations, directions reported to a main control station, and the position given to the pilot

the shortest possible time. The whole of the above arrangement, where full control is given to one man, makes for speed in operating and economy in personnel.

The Transmitting House.—The transmitting room contains the various panels mounting the transmitting apparatus, the high-frequency inductance, and the machines and transformers.

There are two panels in all, the high-frequency panel, and the machine-control and charging panel.

The high-frequency panel mounts the valves, their lighting transformers, the smoothing condensers and chokes, the various phone control transformers and relays.

The machine-control panel carries various switches and fuses, necessary for the transmitting alternator circuits, together with arrangements for charging accumulators from a subsidiary motor generator. The accumulators are charged in a separate room so that acid fumes shall not interfere with the instruments, or the health of the station attendant.

All points at high potential are protected by safety devices so that fear of shock need be entertained.

The High-Frequency Panel.—Alternating current is fed from the machine direct on to the primary of the lighting transformer through a safety switch back on to a separate high-tension transformer, which is not mounted on the high-frequency panel.

The high-tension transformer has three terminals, its secondary being split. The centre point is earthed and the two others connected to the anodes of two rectifiers, so that double rectification takes place and both sides of the alternating current wave utilised. The high-tension supply is smoothed by means of a condenser and choke, and fed through a second high-frequency choke on to the oscillating circuit. There are two valves for the speech-control, a small 100-watt valve for the sub-control and a larger valve for the main-control. Variable resistances and transformers arrange for the speech variations to be magnified and relayed on to the high-frequency circuits. These transformers are mounted on the panel.

The valves themselves are carried behind two coarse-mesh-fronted doors, which swing open. The act of opening the doors cuts off all current from the set and short-circuits the smoothing condenser, so that there is no chance of shock on touching the anodes of the valves.

If the doors are opened the lower panel mounting the filament current adjusters can swing downwards and all the chokes, condensers, transformers, etc., are exposed and can be readily inspected without dismantling the set in any way.

It has been found advisable to provide filament ammeters in series with the valves so that filament brightness, a deceptive indication, is not the only gauge as to the correct adjustment of the current. These ammeters rise to dangerous potentials on the rectifiers, and are, therefore, mounted behind the safety door and can be inspected through a suitable window.

There are two other ammeters on the set, on reading the anode current to the oscillatory and control valves, the other the output current in the closed circuit.

Owing to the wavelength being limited to 900 metres damping-control is used for the transmission of telephony.

No inductances are incorporated with the panel, its functions

being merely to mount the necessary apparatus for setting up oscillatory currents in high-frequency circuits suitably connected.

The send-receive switch which cuts off the high-tension and changes over the aerial from "send" to "receive" is controlled remotely from the receiving house, as is also the starter for the motor alternator. Both the relays for operating these switches are embodied in the set.

They are mounted on the board which carries the ammeters immediately above the valve cabinet, and are readily accessible.

The roof the valve cabinet is composed of mesh-metal, so that good ventilation is assured for the valves.

All the panels are mounted back to the wall, and are carried on a framework which also serves to enclose the subsidiary units such as high-tension transformers, high-frequency condensers, etc.

The Machine-Control Panel.—A standard charging board is embodied in this unit with the necessary resistances, ammeters and voltmeters. Certain parts of the automatic motor starters are also carried and a main power switch cuts off power from all circuits. A switch is arranged which when changed over brings into action a spare alternator, so that fear of prolonged breakdown is minimised.

Aerial and Earth System.—The aerial system and the radiating system is designed to have the least possible resistance. To this end an earth screen is advised.

The aerial is of L construction, being supported on two 70-ft. steel masts, 200 feet apart. The aerial is composed of two "Sausages," consisting of four wires each and carried on a spreader ten feet apart. The lead-in is taken through a suitable insulator which is not screwed directly into the wall, but taken in through two insulating panels. This obviates dielectric loss.

The earth shield consists of spaced wires raised some feet above the earth and insulated.

Aircraft Installation.

The following is a brief description of the latest Marconi Aircraft Telephone and Telegraph Transmitter and Receiver, as employed on aeroplanes flying between London and the Continent.

The chief characteristic of the set is that it combines in one box both transmitter and receiver, connected permanently by cables to a small unit which carries all the handles necessary for control of the set. This small unit, called the Remote Control, can be mounted conveniently to the hand of the user, while the set proper can be stowed away permanently in the most convenient position. The principle of Remote Control enables the pilot, while flying, to have all the necessary adjustments for both sending and receiving either telegraphy or telephony in a very compact space.

The unit construction of transmitter and receiver is suitable for use in the larger types of aircraft, and scores in neatness of design; but where there are any small isolated spaces, as with fighting machines, separate receiver and transmitter are better used.

All the latest developments of Aircraft Wireless have been embodied in this set; elaborate screening to guard against magneto noise, high-frequency amplification with specially damped transformers, so that the receiver is both sensitive and stable; a variometer in the transmitter, to adjust the wavelength exactly, whatever the variations

in capacity of small accumulators.

The set described above is inter-connected on a single board, and fulfils all of the requirements where the set is used than when handled by a single operator, ever, will be a

Supply

power, both for the transmitter, and for the generator, is arranged so that the load is large ranges of power kept continuous, this accumulation to cope with machine increase to prevent the arranged value only comes in

The actual power supplies two units of power for the field coils, 1,500 volts, generator, are specially silenced filaments direct without fear of the received signals permanently connected switched either

The Receiver via a smoothing ripple, to the filter whether the load transmitter. V over, but is specially inactive by switch a rather complicated position it high connects the a generator, and receive position switched off an battery system

The two tuning condensers are for cutting near a ground

in capacity of various types of machine; and, lastly, the use of one small accumulator only which feeds both transmitter and receiver.

The set is an all-purpose arrangement in that it can be used as described above as a pilot-operated set, or, by shortening the various inter-connecting cables, the whole combination can be mounted on a single board, and an operator will have full power to make the set fulfil all of its many uses. It must, of course, be understood that where the set is controlled by an operator, greater flexibility will result than when handled simply from its Remote Control. A pilot, however, will be able to make it suit all his needs.

Supply of Power.—A small wind-driven generator supplies power, both high-tension for feeding the oscillatory circuits of the transmitter, and low-tension for the valve filaments. The accumulator is arranged to be floating across the low-tension commutator of the generator, and does not supply power to the filaments, but is arranged so that the low-tension voltage shall remain constant in spite of the large ranges of air speed of the aeroplane. The accumulator is thus kept continuously charged. If there were no regulator on the generator this accumulator would have to be large, and therefore heavy, in order to cope with the large charging currents that would occur on the machine increasing its flying speed. A regulator is therefore arranged to prevent the voltage of the generator rising above a certain pre-arranged value. This regulator is normally, therefore, quiescent, and only comes into action during the time of abnormal flying speeds.

The actual generator is of unusual design, inasmuch as it comprises two units, one, an exciter, giving 8 volts at 7 amperes, which supplies power for receiver and transmitter valve filaments, and current for the field coils of the second unit which supplies the high-tension, 1,500 volts, 0.1 amperes. Both these, exciter and high-tension generator, are contained in one streamline casing. The generator is specially silenced electrically, so that it is possible to supply the receiver filaments directly from the generator in parallel with the accumulator, without fear that the commutator hum will interfere at all badly with the received signal. Thus great weight is saved, since one accumulator, permanently connected across the low-tension of the generator, can be switched either to transmitter or receiver.

The Remote Control.—Power is fed from the generator, via a smoothing condenser unit which smoothes out the high-tension ripple, to the Remote Control where the send-receive switch determines whether the low-tension supply shall be diverted to the receiver or transmitter. When on the receive side the high-tension is not changed over, but is still on to the transmitter, but the latter is rendered inactive by switching off its valve filaments. Thus the switch fulfils a rather complicated function, inasmuch as when it is placed in the send position it lights the transmitter valves, switches on the high-tension, connects the accumulator across the low-tension commutator of the generator, and changes over the aerial to transmit. When in the receive position the aerial is changed over, the transmitter valves are switched off and the receiving are switched on, the low-tension floating battery system being maintained as before.

The two remaining handles apply to the receiver, and control the tuning condenser for adjusting to the correct wavelength, and a resistance for cutting down the loudness of the receiver speech when flying near a ground station.

The switch resistance and condenser are mounted on a flat base which is covered externally by a hemicylindrical cover. A small lamp is mounted inside the cover and serves to indicate whether the set is oscillating or not. This lamp is inductively shunted directly in the aerial circuit, and if it burns out the set will still continue to function. Only the levers are external to this cover, and all the delicate mechanism is shielded. The movement of the handles corresponds to that of ordinary engine control, and the appearance of the unit is in harmony with aeroplane design generally.

The Remote Control also forms a junction for all the wires connecting the various units. These wires are intended to be brought in at the base of the Remote Control, the bottom cover serving as a protection for the connections and an anchor for the wires so that strain is removed from the soldered joints if the cables are accidentally pulled.

All these wires are bunched appropriately, and each bunch is separately covered by flexible aluminium wire braiding. This acts as a mechanical and electrical protection, and helps, therefore, to eliminate magneto noise, and tends to prevent pinching or fraying of the contained wires. The aluminium cover is electrically connected to the metal flexible cable cover, and so complete screening is obtained. Connected by their cables to the Remote Control are the telegraph unit, the smoothing condenser, and the set (receiver and transmitter) proper. All the wires connected to the Remote Control are intended to be permanently and neatly mounted in the machine. The set proper can be disconnected by removing the plugs which connect the Remote Control to the set. Two plugs are used, one, heavily insulated, for the transmitter circuits, and the other for the receiver.

Transmitter.—The transmitter consists of the usual oscillatory circuits for the generation of continuous waves, and the low-frequency control-circuits for modulating the intensity of these waves, in sympathy with the voice. The former comprises a power-valve and its associated reaction and aerial coils. The aerial coil can be wound to any reasonable wavelength, but the standard arrangement will give 900 metres by the adjustment of the variometer. The wire used is highly stranded and pile-wound, so that a minimum of space and electrical resistance is obtained. The variometer is mounted on the aerial coil former, and once adjusted on the test flight need never again be touched. For an aerial length of 200 or more feet 900 metres should be obtainable with most machines whether large or small.

There is a wavelength switch, the movement of which cuts in or out a certain part of the aerial coil. Thus every set is capable of radiating two chosen wavelengths; with the standard windings these are 900 metres for the aircraft wave, and 600 for getting in touch with commercial and ship stations. This wavelength change cannot be effected from the Remote Control.

The reaction coil is semi-variable, but once set for a particular machine need never be touched.

The control-circuits embody a microphone transformer, choke, and control-valve, for amplifying the voltage variations of the former, and super-imposing these on the high-tension supply. This valve is not a useless load, inasmuch as it instantaneously arranges for an anode voltage sweep on the power-valve approximately double the maximum supplied by the generator; the whole control-circuits are

stable, and have been found very effective in their application both in peace and war to aircraft wireless telephony.

The Receiver.—This is a five-valve circuit consisting of 3-h.f. magnifications, one detector valve, and one note magnifier.

The valves are lighted from the low-tension commutator of the exciter, and fed with high-tension from a battery contained in a box which is held by ebonite-headed screws at the bottom of the set. Two of these screws form the connection from the receiver to the high-tension, while the rest are arranged symmetrically to give further support, and to form feet for the whole set to stand on when on the bench.

The condenser in the Remote Control makes fine variations of wavelength around a fixed wave (900 metres in the standard set). When used as an operator-controlled set, however, it is possible to obtain wavelengths from 1,000 to 450 metres.

This is done by providing an inductance tapping switch, triangular in shape, mounted on top of the box. This has three positions, short, medium, and long, and so provides a coarse wavelength adjustment, the finer changes being given by the movement of the condenser in the Remote Control.

The aerial circuit is inductively coupled to the first high-frequency valve through a so-called aperiodic coil. This coil, when loosely coupled to the aerial circuit, has a natural wavelength equal to that of the standard wave to be worked to. On tightening the coupling, however, the mutual inductance of aerial and aperiodic coil tends to bring in two possible resonance points, one higher and one lower than the wave obtained with loose coupling. Thus by varying the coupling of the aperiodic coil the secondary circuit is tuned, and by varying the coarse wavelength switch in combination with the Remote Control condenser, the aerial circuit is tuned. Thus on the standard wave all the advantages of loose coupling are obtainable, but a large range of other waves is possible by a simple secondary adjustment. The coupling handle is on the left-hand side of the box, and when pushed home gives loose coupling, when pulled out lower or higher ranges are obtainable.

Screening is carried out very thoroughly. The whole of the high-frequency circuits are screened in one metal box, and, further, the aperiodic and aerial coils are screened themselves from the high-frequency transformers. This prevents spurious oscillation, and makes for stability. Reaction, however, is arranged for so that the set can be made to oscillate and work as an auto-heterodyne circuit for the reception of continuous waves, or can be given increased sensitivity for the reception of weak signals by increasing the reaction. These adjustments are made by a twist handle mounted below the coupling handle, and is not greatly affected by wavelength changes or filament maximum of sensitivity is obtained consistent with stability.

The high-frequency transformers are damped very heavily so that the reaction adjustment is fully controllable from the appropriate handle, and is not greatly affected by wave length changes or filament brightness.

In order to cut down too loud signals the valve filaments are dimmed by means of the Remote Control variable resistance.

Low-resistance telephones are used connected across the secondary terminals of a step-down iron transformer, so that no fear of

demagnetizing the phones by the anode current through the note-magnifying valve need be entertained. The necessary wires leading from the Remote Control to the receiver terminate in a plug which can be disconnected if the set is removed from the machine.

The Telegraph Unit.—This unit, permanently connected to the Remote Control, mounts a key, buzzer, and switch. In one position, the key is arranged to cut up the continuous waves into Morse by opening and closing the grid resistance, and so will give continuous wave transmission. In the second position of the switch a buzzer replaces the microphone, the control-valve becomes operative, and interrupted-continuous wave is sent out. A third contact on the switch short-circuits the key, and throws the microphone into circuit in place of the buzzer, and so telephony can be transmitted.

The telegraph unit can be mounted under the pilot's hand, who, therefore, by the simple movement of a 3-way switch, can send out any of the three types of permissible transmission—Interrupted Continuous Waves, Continuous Waves, or Telephony.

There is, lastly, a plug connected to the telegraph unit with the female portion permanently fixed and the male portion connected to the pilot's microphone and telephones. Thus, when the pilot gets out from his machine he only unplugs once and is completely free from his wireless gear, removing his helmet and head receivers, his coat and his microphone in one.

The whole design is best worked out by embodying a breast microphone for the pilot's use. He then has his hands free for all adjustments, wireless an aeroplane control.

Suspension.—The set is provided with lugs to which shock-absorber rubber is attached so that it can be suspended free from mechanical shock.

Winch.—The winch is simple in operation. The winding-up handle embodies the brake so that all the pilot has to do when letting out the aerial is to draw back the handle and regulate the speed of running out by pressing it forward. When fully wound the winch cannot run out, automatically locking itself.

Weight.—The weight is approximately 60lbs., made up as follows:

Transmitter and Receiver Box, with H.T. Battery	17
Remote Control	2
Microphone and Handle	1
Telegraph Unit	1½
Smoothing Condenser	3
Generator and Propeller	16
Accumulator	7
Winch and Fairlead	5
Aerial Wire and Weight	3
Cables and Plugs	5
Head Receivers	1
Suspension Brackets	1½

Total ... 63

Dimensions.—Transmitter and Receiver Box with H.T. Battery: 14½ins. x 6½ins. x 10ins. high. Remote Control: 5ins. x 4½ins. Projection above dashboard, 3ins. Smoothing Condenser: 7 ins. x 4½ins. x 2½ins. Telegraph Unit: 4½ins. x 2½ins. x 2½ins.

Name.	Geographical Position.	Call Signal	Normal Range.	Controlled by	Wavelengths in Metres (the Normal Wavelength in heavy Type).	Nature of Service.	Hours of Service.	Charge.		Remarks.	
								Per Word.	Minimum Charge.		
BELGIUM											
Evère, Brussels ..	—	BAV	—	Belgian Government.	C.W. 900	—	—	Francs.	Francs.	¹ Not yet open for service	
FRANCE											
Bordeaux¹ ..	44° 50' 30" N. 0° 42' 00" N.	AB	300 km	French Government	C.W. 1,400	—	—	—	—		
Le Bourget, Paris ..	48° 57' 00" N. 2° 25' 00" E.	ZM	800 km.	French Government	C.W. & R.T. 1,400, 900	—	0700 to 1900	—	—		
Lyons ..	45° 44' 00" N. 4° 53' 00" N.	AL	400 km.	French Government	C.W. 1,400	—	0700 to 1900	—	—		
Maubeuge¹ ..	—	AV	—	French Government	C.W. 1,200	—	—	—	—		
Nîmes ..	—	AN	300 km.	French Government	C.W. 1,400	—	0700 to 1900	—	—		
St. Inglevert..	50° 33' 00" N. 1° 44' 30" E.	AM	400 km.	French Government	C.W. & R.T. 1,400, 900	—	0700 to 1900	—	—		
NETHERLANDS											
Soesterburg ..	—	STB	—	Dutch Government	C.W. & R.T. 900 & 1,100	—	—	—	—		
Schiphol .. (Amsterdam)	—	KLM	—	Dutch Government	C.W. & R.T. 900 & 1,100	—	—	—	—		
UNITED KINGDOM											
Castle Bromwich ..	—	GEC	—	—	C.W. or R.T. 900	—	—	—	—		
Croydon ..	—	GED	—	Air Ministry	C.W. or R.T. 1,400, 900	—	—	—	—		
Cricklewood¹ ..	—	—	—	Air Ministry	C.W. or R.T. 900	—	—	—	—		
Didsbury ..	—	GEM	—	—	C.W. or R.T. 900	—	—	—	—		

¹ Handley Page private aerodrome station

AVIATION STATIONS—Continued

Name.	Geographical Position.	Call Signal.	Normal Range.	Controlled by	Wavelengths in Metres (the Normal Wavelength in heavy Type).	Nature of Service.	Hours of Service.	Charge.		Remarks.
								Per Word.	Minimum Charge.	
UNITED KINGDOM										
— <i>cont.</i>										
Hinton-Admiral ¹	—	—	—	Air Ministry	C.W. or R.T. 900	—	—	—	Francs	¹ Oriental Mercantile Air Nav. Co. private aerodrome station.
India House	—	GFA	—	Air Ministry	1,400 C.W. C.W. or R.T.	0	—	—	—	
Lynpne	—	GEG	—	—	900	—	—	—	—	
Renfrew	—	GER	—	—	C.W. or R.T. 900	—	—	—	—	
Whittle, Essex ²	—	—	—	Marconi Company	—	—	—	—	—	² Experimental station.
UNITED STATES OF AMERICA										
Anacosta NSF*	District of Columbia	NSF	—	U.S. Navy	300, 600	—	—	—	—	
Bellefonte	Pennsylvania	WWQ	—	Post Office Dept.	—	—	—	—	—	
Brunswick	Georgia	NOS	150	U.S. Navy	300, 600	—	—	—	—	
Chatham N.X.A.*	Massachusetts	NXA	—	U.S. Navy	300, 600	—	—	0.30	—	
Chicago WWG	Illinois	WWG	—	Post Office Dept.	—	—	—	—	—	
Cleveland WWO	Ohio	WWO	—	Post Office Dept.	—	—	—	—	—	
College Park.	Maryland	WWX	—	Post Office Dept.	—	—	—	—	—	
Fire Island NAG*	New York	NAG	—	U.S. Navy	300, 600	—	—	—	—	
Fisherman's Island*	Virginia	NBF	150	U.S. Navy	300, 600	—	—	—	—	
Hampton Roads*	Virginia	NAM	100	U.S. Navy	300, 600	—	—	—	—	
Newark	New Jersey	WWU	150	Post Office Dept.	—	—	—	—	—	
Pensacola	Florida	NAS	—	U.S. Navy	300, 600	—	—	—	—	
	30° 20' 49" N. 87° 16' 06" W.									
Rockaway Beach, New York	40° 34' 05" N. 73° 53' 50" W.	NAH	100	U.S. Navy	300, 600	—	—	—	—	

Stations marked thus (*) are also open to General Public Services.

AIRCRAFT FITTED WITH WIRELESS TELEPHONY

Type of Aeroplane.	Call Signal.	Normal Range.	Aircraft Owner.	Wave- length.	Notes.
NETHERLANDS					
Fokker	HNABC	—	Koninklijke Luchtvaart Maats- chappij voor Nederland en Koloniën.	600, 900	
UNITED KINGDOM					
D.H. 16	GEALU	—	Aircraft Transport and Travel Co., Ltd.	600, 900	
D.H. 18	GEAUF	—	Aircraft Transport and Travel Co., Ltd.	600, 900	
D.H. 18	GEARO	—	Aircraft Transport and Travel Co., Ltd.	600, 900	
Handley Page ..	GEALX	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEASY	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATH	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATG	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATJ	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATK	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATL	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATM	—	Handley Page Transport, Ltd.	600, 900	
Handley Page ..	GEATN	—	Handley Page Transport, Ltd.	600, 900	
Vickers-Vimy ..	GEASI	—	S. Instone & Co., Ltd. ..	600, 900	¹ Experimental
D.H. 6 ¹	GEAAB	—	Marconi Company	—	

THE MARKING OF AIRCRAFT

(A) The nationality mark shall be represented by capital letters in Roman characters—*e.g.*, France, F.

The registration mark shall be represented by a group of four capital letters; each group shall contain at least one vowel, and for this purpose the letter Y shall be considered as a vowel. The complete group of five letters shall be used as a call sign of the particular aircraft in making or receiving signals by wireless telegraphy or other methods of communication, except when opening up communication by means of visual signals, when the usual methods will be employed. The nationality and registration marks are assigned in accordance with the table.

(B) On aircraft other than State and commercial, the registration mark shall be underlined with a black line.

TABLE OF MARKS

The nationality mark of the State named below applies to the aircraft of its Dominions, Colonies, Protectorates, Dependencies, or of countries of which it is the Mandatory Power.

Country.	Nationality Mark.	Registration of Marks.
United States of America ..	N	All communications made in accordance with the provisions of Section 1 (4) using a group of four letters out of the 26 of the alphabet, each group containing at least one vowel—e.g., ADCJ, PURN
British Empire	G	
France	F	
Italy	I	
Japan	J	All communications made with B as first letter. <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " C " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " P " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " R " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " U " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " B " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " G " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " L " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " B " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " P " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " B " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " P " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " C " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " H " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " S " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " H " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " S " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " E " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " G " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " P " </div> <div style="display: flex; justify-content: space-between; width: 100%;"> " " " " H " </div>

GENERAL INFORMATION

UNITED STATES OF AMERICA

The Military Air Service is controlled by the War Department of the United States. Below is copy of a letter of instruction from the Office of the Chief of Air Service, dated February 4th, 1920, outlining the indicatives or call letters assigned for the permanent use of the Air Service.

It is proposed, as a part of the 1922 Air Service projects, that long-distance wireless communications stations will be installed and used, both for inter-field communication and for the dissemination of meteorological data to aircraft. It is contemplated that these stations will be located at the following listed fields and stations:—

Mitchel Field, Mineola, L.I., N.Y.
 Langley Field, Hampton, Va.
 Carlstrom Field, Arcadia, Fla.
 Ellington Field, Houston, Tex.
 El Paso, Texas.
 San Diego, Cal.
 Crissy Field, Calif.
 Camp Lewis, Wash.
 Selfridge Field, Mt. Clemens, Mich.

The Signal Corps is planning the installation of radio stations throughout the United States, for the purpose of disseminating meteorological data to aircraft, which will be received by ground wire from the Weather Bureau officials.

WAR DEPARTMENT.

OFFICE OF THE DIRECTOR OF AIR SERVICE, WASHINGTON.

February 4th, 1920.

R OF INSTRUCTION

No. 2.

: RADIO OFFICERS, ALL AIR SERVICE ACTIVITIES.

Subject: Radio Call Letters, or Indicatives, for all Air Service Radio Stations.

A block of indicatives, or call letters, has been assigned for the present use of the Air Service. The indicatives are divided into five divisions—i.e., V, W, X, Y and Z. The indicatives are to be made of two letters and one figure. The first letter of the indicative is to be one of the above letters. The five main divisions are assigned as follows:—

Western Department.. ..	VA1 to VZ0
Central Department	WA1 to WZ0
Eastern and South-Eastern Department	XA1 to XZ0
Insular Possessions	YA1 to YZ0
Southern Department	ZA1 to ZZ0

The indicatives will be effective at 00.1 o'clock on April 1st, 1920. Officers in charge of Air Service radio stations are responsible for the execution of the change of indicatives with any stations with which they are working.

Indicatives for the squadrons will be assigned by the Group Radio Officer under which the squadron is operating, from the block of indicatives assigned to the Group, and indicatives for the airplanes of a squadron will be assigned by the squadron radio officer from the block of indicatives assigned to the squadron by the Group Radio Officer.

As soon as the blocks of indicatives have been assigned the squadron Group Radio Officer, he will send a copy to the Wing Radio Officer, who, in turn, will submit a copy of complete assignment to this Office, through the Group Radio Officer.

Attached are the assignments of indicatives for Departments, Wings and Groups, and the reserve indicatives allotted to each.

By direction of the Director of Air Service,

WM. F. PEARSON,

Colonel, A.S.A.,

Administrative Executive.

WESTERN DEPARTMENT.

VA1 to VZ0

STATION.

CALL LETTERS.

Mather Field, Sacramento, California ..	VA1
(a) Reserve—for assignment squadron and airplane ..	VA2 to VD0
Ross Field, Arcadia, California ..	VF1
(a) Reserve—for assignment squadron and airplane ..	VF2 to VI0
March Field, Riverside, California ..	VK1
(a) Reserve—for assignment squadron and airplane ..	VK2 to VP0

signifies "zero."

WESTERN DEPARTMENT (*continued*)

STATION.	CALL LETTERS
Rockwell Field, Coronado, California ..	VR1
(a) Reserve—for assignment to squadron and airplane ..	VR2 to VU0
Ream Field, Imperial Beach, San Diego, California ..	VW1
(a) Reserve—for assignment to squadron and airplane ..	VW2 to VX0

CENTRAL DEPARTMENT.

WA1 to WZ0

STATION.	CALL LETTERS.
McCook Field, Dayton, Ohio ..	WA1
(a) Reserve—for assignment to squadron and airplane ..	WA2 to WB0
Post Field, Ft. Sill, Oklahoma ..	WC1
(a) Reserve—for assignment to squadron and airplane ..	WC2 to WH0
United States Army Balloon School, Ft. Omaha, Nebraska ..	WI1
(a) Reserve—for assignment to squadron and airplane ..	WI2 to WJ0
Godman Field, Stithton, Kentucky ..	WK1
(a) Reserve—for assignment to squadron and airplane ..	WK2to WK0

EASTERN AND SOUTH-EASTERN DEPARTMENT.

XA1 to XZ0

STATION.	CALL LETTERS.
Air Service, Washington, D.C. ..	XA1
(a) Reserve—for assignment to squadron and airplane ..	XA2 to XA0
Bolling Field, Washington D.C. ..	XB1
(a) Reserve—for assignment to squadron and airplane ..	XB2 to XD0
Langley Field, Hampton, Virginia ..	XF1
(a) Reserve—for assignment to squadron and airplane ..	XF2 to XJ0
Mitchel Field, Mineola, L.I., N.Y....	XK1
(a) Reserve—for assignment to squadron and airplane ..	XK2 to XM0
Aberdeen Proving Grounds, Aberdeen, Md.	XN1
(a) Reserve—for assignment to squadron and airplane ..	XN2 to XO0
Carlstrom Field, Arcadia, Florida ..	XP1
(a) Reserve—for assignment to squadron and airplane ..	XP2 to XS0
Pope Field, Fayetteville, North Carolina..	XU1
(a) Reserve—for assignment to squadron and airplane ..	XU2 to XU0

NOTE : 0 signifies "zero."

INSULAR POSSESSIONS.

YA1 to YZ0

STATION.	CALL LETTERS.
Philippine Islands, A.S. Headquarters ..	YA1
(a) Reserve—for assignment to squadron and airplane ..	YA2 to YF0
Hawaiian Islands	YG1
(a) Reserve—for assignment to squadron and airplane ..	YG2 to YK0
Panama Canal Zone	YL1
(a) Reserve—for assignment to squadron and airplane ..	YL2 to YP0

SOUTHERN DEPARTMENT.

ZA1 to ZZ0

STATION.	CALL LETTERS.
Kelly Field, San Antonio, Texas ..	ZZ1
(a) Reserve—for assignment to squadron and airplane ..	ZZ2 to ZZ0
First Wing Headquarters	ZA1
(a) Reserve—for assignment to squadron and airplane ..	ZA2 to ZA0
First Surveillance Group	ZB1
(a) Reserve—for assignment to squadron and airplane ..	ZB2 to ZJ0
First Day Bombardment Group ..	ZK1
(a) Reserve—for assignment to squadron and airplane ..	ZK2 to ZR0
First Pursuit Group	ZS1
(a) Reserve—for assignment to squadron and airplane ..	ZS2 to ZY0

The Postal Radio Service is owned and operated by the Post Office Department.

The United States Air Mail Service has been experimenting with aircraft radio since February, 1919. Its principal efforts have been directed to the solution of the problem of Radio Direction Finding and Radio Field Localising. The solution of these problems has been pursued with the aid of the Bureau of Standards and data furnished by the Navy Department, with considerable original research by the Air Mail Service. A simplified Radio Direction Finder, based on the Robinson principle of fixed A and B coils, was evolved, and has been practically applied to single-manned planes of this service. Pilots with no previous experience have flown directly over the radio stations at destination by this means.

The problem of field localizing jointly solved by the Air Mail Service and the Bureau of Standards, has resulted in the discovery and practical application of the so-called Radio Frequency Field Localiser System. This system, in brief, consists of two large horizontal single-turn coils in which radio frequency currents flow in opposite directions. As a result, the electromagnetic field extends upward in an expanding cone. An aeroplane utilising radio direction finding during periods of poor visibility can, of course, fly to the vicinity of the landing field. From this point the field localizer directs them to the immediate vicinity of the field itself.

NOTE : 0 signifies " zero."

During August, 1920, it was found that telegraph communication could not be furnished for the trans-continental Air Mail Service. As a result, it was decided on August 20th to instal a chain of radio stations across the continent, tying in each of the Air Mail fields.

There are eleven of these stations installed on or near various Air Mail fields. Those in operation are (1) College Park, Md. 2 kw. Quenched Spark, (2) Bellefonte, Pa. 5 kw. Quenched Spark, (3) Omaha, Neb., 5 kw. Quenched Spark, (4) Cheyenne, Wyo., 2 kw. Arc.

Stations located at the following points have been in operation since October 15th:—(1) Salt Lake City, Utah, 2 kw. Arc; (2) Elko, Nevada, 2 kw. Arc; (3) Reno, Nevada, 2 kw. Arc. The following stations were completed on November 1st, 1920:—(1) St. Louis, Mo., 5 kw. Quenched Spark; (2) North Platte, Nebr., 2 kw. Arc; (3) Rock Springs, Wyo., 2 kw. Arc.

These stations are not only used for inter-station traffic, but are also utilised for aeroplane radio communication and radio direction finding.

It is proposed to utilise all the radio stations of the Air Mail Service for Radio Research work, such as investigation of shifting signals, static and other kindred problems.

GERMANY

The Koenigs Wusterhausen Station (Call Letters, LP) sends out notices for aircraft on a 3,600-metre wave at 1010 and 2010.

USEFUL DATA SECTION

(A) Wireless Terminology : --

(i) Definitions.

(ii) Foreign Equivalents.

(B) General Information and Useful Tables.

USEFUL DATA

*Specially Revised for the Year-Book by E. V. Appleton, M.A. (Cantab.),
M.Sc. (Lond.).*

IN view of the increasing amount of space taken up by other sections it proved impossible to continue the development and expansion of this section *within the Year-Book* so as to meet all the requirements of the recent phenomenal growth of the radio art. Moreover, such a course would hardly seem desirable, as such information could only be adequately treated in a volume wholly devoted to the subject. We therefore publish a separate volume under the title *Standard Tables and Equations in Radiotelegraphy*, compiled and edited for "The Wireless Press, Ltd.," by Bertram Hoyle, M.Sc. (Tech.), A.M.I.E.E.

The whole of the following section has been revised and brought up to date, and space has also been found for several additional features. It is natural to associate the later development of radiotelegraphy with the evolution of the thermionic valve, and in view of this a table of Atomic and Electronic Data has been added, together with a consistent scheme of symbols and terms for quantitative valve work. The list of definitions has also been expanded so as to include all the present valve nomenclature. In spite of the amount of work already done, thermionic valve and allied wireless problems still offer an extensive and profitable field for investigation to both amateur and professional wireless men, and in this connection a convenient and adequate system of recording circuits used is required. We have, therefore, included a sub-section on the conventional symbols commonly used in wireless diagrams.

WIRELESS TERMINOLOGY

(A) Definitions.

NOTE.—Terms are generally arranged alphabetically according to the noun referred to.

1. **AERIAL.**—The system of conductors designed to radiate, or absorb electro-magnetic waves.

2. **AERIAL CIRCUIT.**—The circuit comprising the aerial conductors, the earth conductors, and all inductances and condensers connected between them. As the aerial wires possess capacity with respect to the earth and the aerial conductors themselves possess inductance the aerial circuit has a natural oscillation frequency.

3. **AERIAL RESISTANCE.**—(See Antenna Resistance.)

4. **ÆTHER.**—See Ether.

5. **ALTERNATING CURRENT.**—One which reverses its direction periodically with time, the "periodic time" being the interval between two successive maxima of current in the same direction.

6. **ALTERNATOR.**—A rotating machine which transforms mechanical energy into electrical energy, producing at its terminals one or more alternating E.M.F.'s (single phase or polyphase).

7. **AMMETER (HOT BAND: HOT WIRE).**—An ammeter dependent for its indications upon the change in dimensions of an element which is heated by a current through it. In most cases the expansion of the wire is measured by the alteration in the amount of sag.

8. **AMMETER, THERMO.**—An instrument for measuring current, depending for its indications on the voltage generated at the terminals of a thermo junction heated either directly or indirectly by the current to be measured.

9. **AMPERE-TURN.**—The unit of magneto motive force. In an air case solenoid the magneto motive force is equal to the product of the number of turns of the coil and the amperage through the coil.

10. **AMPLIFIER OR AMPLIFYING RELAY.**—An instrument which modifies the effect of a local source of energy in accordance with the variations of received energy; and in general produces a larger indication than could be had from the incoming energy alone. Most modern amplifiers consist of arrangements of three-electrode valves in cascade, the inter-valve connections being made by transformers, high resistances or condensers or by combinations of these.

11. **AMPLIFIER, HIGH FREQUENCY.**—An amplifier designed for the amplification of high or radio frequency oscillations. In a valve amplifier of this type air core transformers are commonly used as the inter-valve connections.

12. **AMPLIFIER, LOW FREQUENCY.**—An amplifier designed for the amplification of low or audio-frequency signals. In a valve amplifier of this type iron core transformers are commonly used as the inter-valve connections.

13. **AMPLIFICATION, CO-EFFICIENT OF.**—The ratio of the useful effect obtained by the employment of the amplifier to the useful effect obtained without that instrument. In particular the amplification constant of a thermionic valve may be defined as the ratio of the slopes of the grid voltage—
anode current and the anode voltage—
anode current characteristics at any operating point.

14. **AMPLITUDE.**—The maximum value of current or voltage attained during any half period of an alternating current or voltage is called the amplitude during that half period.

15. **ANGULAR VELOCITY (or ANGULAR FREQUENCY).**—Of a periodic alternating current or voltage is the product of 2π and the frequency in cycles per second.

16. **ANODE.**—(a) In an electrolytic cell. The conductor through which the current enters the liquid.

(b) In a primary cell. The metal (usually zinc) through which the current enters the electrolyte. It is also termed the negative terminal.

(c) The terminal by which the current enters a cell or other apparatus, such as a vacuum tube, thermionic valve, etc. In a thermionic valve the anode is often termed the "plate" or less commonly the "sheath."

17. **ANODE CIRCUIT.**—See Plate Circuit.

18. **ANTENNA.**—See Aerial.

19. **ANTENNA, DIRECTIVE.**—An antenna having the property of radiating a maximum energy in one (or more) directions.

20. **ANTENNA, FLAT TOP.**—An antenna having horizontal wires at the top covering a large area.

21. **ANTENNA, HARP.**—An antenna having an approximately vertical section of large area and considerable width.

22. **ANTENNA, INVERTED L.**—A flat top antenna in which the leading down wires are taken down from one end of the long horizontal section.

23. **ANTENNA, LOOP.**—An antenna in which the wires form a closed circuit part of which may be the ground.

24. **ANTENNA, PLAIN.**—An approximately vertical single wire.

25. **ANTENNA, T.**—A flat top antenna in which the horizontal section is long and narrow, the leading down wires being taken from the centre.

26. **ANTENNA, UMBRELLA.**—An antenna the conductors of which form the elements of a cone from the elevated apex of which the leading down wires are brought.

27. **ANTENNA RESISTANCE.**—Is that resistance which if inserted at the antinode of current in the antenna would dissipate the same power as that radiated by the antenna.

Antenna resistance includes :

- (a) Radiation resistance.
- (b) Ground or earth resistance.
- (c) Radio frequency ohmic resistance of antenna and loading coil and shortening condensers.
- (d) Equivalent resistance due to corona, eddy currents, and insulator leakage.
- (e) Absorption in neighbouring imperfect dielectrics.

28. APERIODIC CIRCUIT.—A circuit which has no definite time period, this being due either to its resistance being large enough to prevent natural oscillations occurring or to its having no capacity or no inductance and therefore no oscillatory properties.

29. ARC.—"A luminous discharge of electricity through a gas in which the material of one or both the electrodes is volatilised and takes part in the conduction of the current, whether continuous or alternating" (B.E.C.). **ARC.**—The passage of an electric current of relatively high density through a gas or vapour the conductivity of which is mainly due to the electron emission from the self-heated cathode. Under present practical conditions the phenomena take place near atmospheric pressure (I.R.E.).

30. ARC OSCILLATOR.—An arc used with an oscillating circuit for the conversion of direct to alternating or pulsating current. The oscillations generated are classified as follows:—

Class (1).—Those in which the amplitude of the oscillation circuit current produced is less than the direct current through the arc.

Class (2).—Those in which the amplitude of the oscillation circuit current is at least equal to the direct current, but in which the direction of the current through the arc is never reversed.

Class (3).—Those in which the amplitude of the initial portion of the oscillation circuit current is greater than the direct current passing through the arc, and in which the direction of the current through the arc is periodically reversed.

31. ARRESTER, EARTH.—A spark gap with a small gap and large sparking surfaces; used to protect receiving apparatus from powerful discharges.

32. ASYNCHRONOUS.—"A term applied to an A.C. generator or motor, the speed of which has no fixed relation to the frequency of the current" (I.E.C.).

33. ATMOSPHERIC ABSORPTION.—That portion of the total loss of radiated energy due to atmospheric conductivity, reflection, and refraction.

34. ATMOSPHERICS.—Disturbances produced in the receiving circuits caused by electrical action in the atmosphere or in the earth's surface. They are also known as "X's," "Strays," or "Parasitic Signals," and in the U.S.A. as "Static."

35. ATTENUATION (RADIO).—This is the decrease, with distance from the radiating source, of the amplitude of the electric and magnetic forces constituting an electro-magnetic wave.

36. ATTENUATION, CO-EFFICIENT OF (RADIO).—The co-efficient, which when multiplied by the distance of transmission through a uniform medium, gives the natural logarithm of the ratio of the amplitude of the electric or magnetic force at that distance to the initial value of the corresponding quantity.

37. AUDIBILITY.—The ratio of the telephone current variation producing the received signal to that producing a just audible signal—*i.e.*, one which permits the mere differentiation of dots and dashes.

The measurement of audibility is an arbitrary method for determining the relative loudness of telephone response in radio receivers, in which it is stated that a signal has an audibility of given value. The determination of the above ratio may be made by placing a resistance in parallel with the telephone and reducing its value until the limit of audibility is reached. The

audibility of the given signals is then given by $\frac{s+t}{s}$ where s is the impedance of the shunt and t the impedance of the telephone for the frequency and wave-form of the impulses through it.

38. **AUTODYNE RECEPTION** (also termed **ENDODYNE RECEPTION**).—A scheme of reception for continuous waves in which the receiver itself generates the local oscillations required for the production of a beat note with the incoming oscillations.

39. **AUTO-JIGGER**.—See Jigger.

40. **AUTOMATIC RECEIVER**.—A receiver which records signals so they can be translated at any convenient time after reception.

41. **AUTO-TRANSFORMER**.—A coil with a core of air or iron in which the primary and secondary windings have a number of turns in common.

42. **AUTOMATIC TRANSMITTER**.—A transmitter which has the usual operating key replaced by any mechanical telegraph sender such as a Wheatstone transmitter.

43. **BALANCING AERIAL**.—An aerial used in duplex wireless telegraphy. It fills a purpose similar to that of the artificial line in duplex wire telegraphy.

44. **BATTERY**.—A primary or secondary cell for producing electric current or a collection of such units. A collection of condenser units.

45. **BEAT**.—When two oscillations of slightly different frequencies are impressed on an electrical circuit they periodically help and oppose each other. The result is an oscillation the amplitude of which varies in a regular and periodic manner. The time between two successive maxima of amplitude is called the period of the beat. The beat frequency is equal to the difference of the frequencies of the component oscillations.

46. **BLUE GLOW**.—In a soft thermionic valve is the emission of light which accompanies intense ionisation by collision.

47. **BRUSH DISCHARGE**.—"A discharge having a feathery form, and consisting of an intermittent partial discharge which takes place from a conductor when the potential difference exceeds a certain limit, but is not high enough to cause the formation of a true spark or arc. It is always accompanied by a hissing or cracking sound" (I.E.C.). When such a discharge is being given off by a conductor the latter is said to be "Brushing."

48. **BRUSH OR CORONAL LOSSES**.—Those due to leakage convection electric currents through a gaseous medium.

49. **BUZZER**.—A small mechanism (usually electromagnetic) used for rapidly making and breaking an electric circuit. When connected in series with part of a circuit in which oscillations are possible it continually impulses the circuit, thereby producing oscillations which are convenient for testing purposes.

50. **CAGE CONDUCTOR**.—A group of parallel wires arranged as the elements of a long cylinder.

NOTE.—Any conducting element of an antenna may be a cage conductor.

51. **CAPACITY**.—That property of a material system by virtue of which it is capable of storing energy electrostatically. The capacity of a system is dependent on its geometrical dimensions, its position relative to other conductors and the dielectric constants of the surrounding media.

Capacity is measured by the ratio of the quantity of electricity stored to the potential difference at which it is stored.

A distinctive property of a capacity is that it permits the passage of electrical energy through it only in the form of displacement currents. The

reactance of a capacity C for such currents is equal to $\frac{1}{Cp}$ where p is the angular frequency of the alternating current.

52. **CAPACITY, EFFECTIVE, OF AN ANTENNA**.—The effective capacity and effective inductance of an antenna at any oscillation frequency are the

equivalent capacity and inductance values determined from the following fundamental equations :

$$\omega = \sqrt{\frac{1}{LC}} \quad \dots \dots \dots (1)$$

where L = the total antenna inductance.

C = the total antenna capacity,

ω = the angular velocity of the free alternating currents in the antenna.

$$d = \pi R \sqrt{\frac{C}{L}} \quad \dots \dots \dots (2)$$

or
$$d' = \pi R' \sqrt{\frac{C}{L}} \quad \dots \dots \dots (2a)$$

where R' = series resistance inserted at the base of the antenna and
 d' = increased decrement resulting therefrom.

Solving (1) and (2a) for L and C , we have

$$L = \frac{\pi R'}{\omega d'} = \frac{R'}{6 \times 10^8 \times d'} \quad \lambda \quad (\lambda \text{ in meters}).$$

$$C = \frac{d'}{R'} = \frac{d'}{6 \pi^2 \times 10^8 \times R'} \quad \lambda \quad (\lambda \text{ in meters}).$$

Having the antenna inductance and capacity, the resistance R of the antenna can be determined from equation (2). This value of R satisfies the fundamental equation :

RI^2 = power absorbed by the antenna,

where I = current measured at the base of the antenna.

NOTE.—The equation

$$I = \omega CE$$

$$\left(\text{and also } E = \frac{\pi R'}{d'} \cdot I \right)$$

defines an effective voltage E , which is the voltage approximately given by the equation. Energy per spark = $\frac{1}{2}CE^2$.

A useful approximate formula for the fundamental wavelength of an inverted L antenna is the following :

$$\lambda \text{ (metres)} = 1,884 \sqrt{\left(L + \frac{L_o}{3}\right) C},$$

where C_o is calculated static capacity,

L_o is ordinary calculated inductance in microhenries.

L is inductance of loading coil in microhenries.

53. CATHODE.—See Kathode.

54. CATHODE OF THERMIONIC VALVE.—See Filament.

55. CENTRE OF CAPACITY OF AN ANTENNA.—See Form Factor, Note 2.

56. CHANGER, FREQUENCY.—A device delivering alternating currents at a frequency which is some multiple of frequency of the supply current.

57. CHANGER, WAVE.—A transmitting device for rapidly and positively changing the wavelength.

58. CHARACTERISTIC CURVE.—A curve showing the variation of a property of a material or a piece of apparatus when submitted to a changing influence which produces that variation.

The characteristic curves of a thermionic valve or arc or crystal show the relations between the various applied potentials and resulting currents.

59. **CHARACTERISTIC, DYNAMIC, OF A CONDUCTOR** (for a given frequency and between given extremes of impressed E.M.F. and resultant current through the conductor).—This is the relation given by the curve obtained when the impressed E.M.F.'s are plotted as ordinates against the resultant currents as abscissas, both E.M.F.'s and currents varying at the given frequency and between the given extremes.

60. **CHARACTERISTIC, STATIC, OF A CONDUCTOR**.—This is the relation given by the curve plotted between the impressed electromotive force as ordinates and the resultant current through the conductor as abscissas, for substantially stationary conditions.

61. **CHOKING COIL**.—"A coil with so great a self-induction that its impedance depends chiefly on the self-induction rather than upon the resistance" (I.E.C.). Generally called a Reactance Coil in U.S.A.

62. **CIRCUIT, CLOSED OSCILLATING**.—A circuit in which the capacity and inductance in series are localised substantially in different places, and which has very small power of radiating electromagnetic waves.

63. **CO-EFFICIENT, ATTENUATION, RADIO**.—See Attenuation.

64. **CO-EFFICIENT OF AMPLIFICATION**.—See Amplification.

65. **CO-EFFICIENT OF COUPLING, INDUCTIVE**.—The ratio of the effective mutual inductance of two circuits to the square root of the product of the effective self-inductances of each of these circuits.

66. **CODE**.—A system of conventional characters designed to represent letters by dots and dashes. The International Morse Code is official.

67. **COHERER**.—A form of detector (q.v.). An imperfect contact or collection of such contacts so arranged that when under the influence of an alternating potential it coheres and allows current from a local battery to pass and make some kind of signal. A device sensitive to radio frequency energy, and characterised by (1) a normally high resistance to currents at low voltages, (2) a reduction in resistance on the application of an increasing electromotive force, this reduction persisting until eliminated by the application of a restoring or disturbing mechanical force, and (3) the substantial absence of thermo-electric or rectifying action.

68. **COMMUNICATION RADIO**.—The transmission of signals by means of electromagnetic waves originating in a constructed circuit.

69. **COMPASS RADIO**.—A radio receiving device for determining the direction (or the direction and its opposite) in which maximum energy is received; or

A radio transmitting device for determining the direction (or the direction and its opposite) of maximum radiation.

70. **CONDENSER**.—A material system possessing electrostatic capacity. Two conducting surfaces separated by a dielectric.

71. **CONDENSER, AIR**.—A condenser having air as its dielectric.

72. **CONDENSER, COMPRESSED GAS**.—A condenser having compressed gas as its dielectric.

73. **CONDUCTOR CAGE**.—See Cage Conductor.

74. **CONJUGATE MUTUAL CONDUCTANCE** of a thermionic valve is given by the slope of the anode voltage-grid current characteristic at any operating point.

75. **CONTINUOUS CURRENT**.—A term recommended by the I.E.C. to supersede "direct current" as a description of "an electric current in one direction and sensibly steady or free from pulsation. Abbreviated CC."

76. **CONTINUOUS WAVES**.—The term applied to waves radiated from an aerial in which oscillations are sustained. Continuous waves may have successive half periods of equal amplitude, or the amplitude may vary within small limits without detriment to their use for wireless telegraphy.

77. **CONTROL ELECTRODE OF THERMIONIC VALVE**.—See Grid.

78. CONVECTION CURRENT.—A transfer of electrical energy by separate charged particles.

79. CONVERTER, ROTARY.—A machine for converting electrical energy of one form of current to electrical energy of another form, such as from alternating current to continuous or *vice versa*.

80. CORONA.—See Brush or Coronal Losses.

81. COUNTERPOISE.—A system of electrical conductors forming one portion of a radiating oscillator the other portion of which is the antenna. In land stations, a counterpoise forms a capacitive connection to ground.

82. COUPLER.—An apparatus which is used to transfer radio frequency energy from one circuit to another by associating portions of these circuits.

83. COUPLER, CAPACITIVE.—An apparatus which, by electric fields, joins portions of two radio frequency circuits, and which is used to transfer electrical energy between these circuits through the action of electric forces.

84. COUPLER, DIRECT.—A coupler which magnetically joins two circuits having a common conductive portion.

85. COUPLER, INDUCTIVE.—An apparatus which by magnetic forces joins portions of two radio frequency circuits.

86. COUPLING.—The connection between two circuits enabling energy to be transferred from one to the other. The connection may be by magnetic linkage, electrostatic linkage, direct connection, or any combination of these.

87. COUPLING, CO-EFFICIENT OF, in inductively coupled system is the ratio of the mutual inductance of the two circuits to the square root of the product of the self-inductance of the circuits. The coefficient of coupling (k) between two circuits tuned to the same frequency and then coupled, is also given by the formula :—

$$k = \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2 + \lambda_2^2}$$

where $\lambda_1 \lambda_2$ are the longer and shorter resulting natural wavelengths of the coupled system.

88. CRITICAL RESISTANCE.—That resistance which is just sufficient to prevent free oscillation in an electrical circuit. If L inductance,

C Capacity, then Critical Resistance = $\sqrt{\frac{4L}{C}}$.

89. CRYSTAL DETECTOR.—A detector which uses the rectifying properties of the contact between a crystal and a metal surface or between two crystals.

90. CURRENT, DAMPED ALTERNATING.—An alternating current whose amplitude progressively diminishes. (Also called oscillating current.)

91. CURRENT, FORCED ALTERNATING.—A current, the frequency and damping of which are equal to the frequency and damping of the exciting electromotive force. See further, Current, Free Alternating.

NOTE 1.—During the initial stages of excitation, both free and forced currents co-exist.

92. CURRENT, FREE ALTERNATING.—The current following any transient electromagnetic disturbance in a circuit having capacity, inductance, and less than the critical resistance. See further, Resistance, Critical.

93. CURVE, DISTRIBUTION, OF A RADIO TRANSMITTING STATION FOR A GIVEN DISTANCE.—This is a polar curve the radii vectors of which are proportional to the field intensity of the radiation at that distance in corresponding directions. See also Compass, Radio.

NOTE 1.—The distribution curve depends, in general, not only on the form of the antenna, but also on the nature of the ground surrounding the station.

NOTE 2.—The distribution curve generally varies with the distance from the station.

94. **CURVE, RESONANCE, STANDARD.**—A curve the ordinates of which are the ratios of the square of the current at any frequency to the square of the resonant current, and the abscissas are the ratios of the corresponding wavelength to the resonant wavelength; the abscissas and ordinates having the same scale.

95. **CYCLOGRAM.**—See Characteristic Dynamic.

96. **CYCLOGRAPH.**—An instrument for the production of cyclograms.

97. **CYMOMETER.**—A "wave-measurer." See Wavemeter.

98. **DAMPING.**—The diminution of energy in an electrical circuit resulting from loss of energy.

99. **DAMPING FACTOR (of a simple circuit).**—The ratio of the effective resistance of that circuit to twice the effective inductance (the reciprocal of a time). This term applies only to circuits capable of carrying free alternating currents.

100. **DECREMENT.**—See Decrement, Linear, and Logarithmic.

101. **DECREMENT, OF A LINEARLY DAMPED ALTERNATING CURRENT.**—This is the difference of successive current amplitudes in the same direction divided by the larger of these amplitudes.

NOTE.—Let I_n and I_{n+1} be successive current amplitudes in the same direction of a linearly damped alternating current.

Then, the linear decrement, which is not a constant but varies with the amplitude,

$$b = \frac{I_n - I_{n+1}}{I_n}$$

Also: $I_t = I_o (1 - bft)$,

where I_o = initial current amplitude,

I_t = current amplitude at time t ,

f = frequency of alternating current.

$b = (I_o - I_1) / I_o$.

102. **DECREMETER.**—An instrument for measuring the logarithmic decrement of a circuit or of a train of electromagnetic waves.

103. **DETECTOR.**—That portion of the receiving apparatus which, connected to a circuit carrying currents of radio frequency, and in conjunction with a self-contained or separate indicator, translates the radio frequency energy into a form suitable for operation of the indicator. This translation may be effected either by the conversion of the radio frequency energy, or by means of the control of local energy by the energy received.

104. **DEVICE, ACOUSTIC RESONANCE.**—A device which utilises in its operation resonance to the audio frequency of the received signals.

105. **DIELECTRIC.**—Any medium which will only allow of electric conduction to a small or negligible extent.

106. **DIELECTRIC CONSTANT (or Specific Inductive Capacity) of a medium.** The ratio of the capacity of a condenser having that medium as a dielectric to the capacity of a condenser having a vacuum dielectric, but otherwise identical. (The dielectric constant of air is substantially unity, and therefore for all practical purposes air may be used in place of the vacuum in the comparison condenser.)

107. **DIELECTRIC HYSTERESIS.**—That lagging property of a dielectric which is measured by the energy lost when the rising and falling (displacement current)—(Voltage) characteristics (dynamic) are not identical.

108. **DIELECTRIC HYSTERETIC CONSTANT** of a given dielectric The value of the dielectric hysteresis per cycle per unit of potential gradient applied to the dielectric.

109. **DIFFRACTION** is the deviation of the direction of propagation of a wave from the normal to the wave front at the point where the waves pass

the edge of an obstruction. The amount of diffraction depends on the wavelength and increases with increase of wavelength.

110. **DIPLEX TELEGRAPHY** is the simultaneous transmission or the simultaneous reception of two messages at the same station.

111. **DIRECT COUPLING**.—When one circuit is linked to another in such a way that a portion of the one forms part of the other they are said to be direct-coupled. An example is provided in the auto-jigger (*vide* Jigger), in which a portion of the inductance is common to two circuits.

112. **DIRECTION FINDER, WIRELESS**.—A receiving instrument which, in combination with a special aerial system, enables the direction of the transmitting station to be determined.

113. **DISC DISCHARGER, ASYNCHRONOUS**.—A disc discharger the speed of which has no fixed relation to the frequency of the current charging the condenser which it discharges.

114. **DISC DISCHARGER, SYNCHRONOUS**.—A disc discharger usually directly coupled to the alternator supplying power to the condenser. It may discharge the condenser, one, two, three, or more times during a half-period; or every one, two, or more half-periods. The usual practice is to discharge once every half-period, at the moment when the condenser potential is a maximum, and the alternator current zero.

115. **DISRUPTIVE VOLTAGE**.—The voltage required to break down a piece of dielectric between a given pair of electrodes.

116. **DISCHARGER**.—That piece of apparatus in the primary oscillating circuit at which the spark takes place.

117. **DUPLEX TELEGRAPHY**.—Is the transmission of a message and the reception of a message simultaneously at the same station.

118. **DISPLACEMENT CURRENT**.—The electrical condition within a dielectric region of varying electric stress. It produces the same external electric and magnetic effects as the equivalent conduction current.

119. **DYNATRON**.—A three-electrode thermionic tube which depends for its action on the liberation of electrons from the anode by electronic bombardment.

120. **EARTH CONNECTION, OR "EARTH"**.—The connection to the earth which in most systems forms the lower extremity of the Aerial System (q.v.). It usually takes the form of a system of metal plates or wires, or a combination of both, more or less deeply buried in the ground. (U.S. equivalent, Ground.)

121. **EDDY CURRENTS**.—Those induced in conducting masses by external varying magnetic fields, the location of these currents being primarily determined by the position of the fields and not by the configuration of the conducting masses. (That is, the conducting mass is not specially arranged to provide perfectly well-defined circuits.) Such parasitic currents are also called Foucault currents. They can be minimised by using stranded or laminated conductors.

122. **ELECTRIC POTENTIAL** is defined as the work done in carrying a unit charge of electricity from infinity to the point considered. (See Electromotive Force.)

123. **ELECTRIC STRESS**.—The cause of the electrically strained condition in the medium between two regions which are at different potentials.

124. **ELECTROMAGNETIC WAVE**.—A progressive disturbance characterised by the existence on the wave front of electric and magnetic forces acting in directions which are perpendicular to each other and to the direction of propagation of the wave.

125. **ELECTROMOTIVE FORCE**.—The force which tends to displace electricity, and is equal to the difference of potential between the points considered.

126. **ELECTRON**.—The natural unit of negative electricity (4.774×10^{-10} electrostatic units).

127. **ENDODYNE RECEPTION**.—See Autodyne Reception.

128. **ETHER.**—The medium assumed by electromagnetic theory in order to explain the translation of energy at finite speed by electro-magnetic waves.

129. **EXCITATION, IMPULSE.**—A method of producing free alternating currents in an excited circuit in which the duration of the exciting current is short compared with the duration of the excited current.

NOTE.—The condition of short duration implies that there can be no appreciable reaction between the circuits.

130. **FACTOR, DAMPING.**—The product of the logarithmic decrement and the frequency of an exponentially damped alternating current.

Let I_0 = initial amplitude,

I_t = amplitude at the time t ,

e = base of Napierian logarithms (2.718+)

α = damping factor.

Then, $I_t = I_0 e^{-\alpha t}$.

131. **FACTOR, FORM.**—The form factor of a symmetrical antenna for a given wavelength is the ratio of the algebraic average value of the R.M.S. currents measured at all heights to the greatest of these R.M.S. currents.

NOTE 1.—For a given R.M.S. current at the base of the antenna, the field intensity at distant points is proportional to the form factor times the height of the antenna.

NOTE 2.—The effective height (height of centre of capacity) is equal to the form factor times the actual height of the antenna.

NOTE 3.—The limiting values of the form factor for various types of antennas are as follows:

	LINEAR OR VERTICAL ANTENNA	FLAT TOP UMBRELLA ANTENNA
Long Waves	Lower Limit, $1/2$	Upper Limit, 1
Fundamental	Lower Limit, $2/\pi$	

NOTE 4.—The form factor varies in a given antenna at various wavelengths due to variation of the current distribution.

132. **FILAMENT BATTERY OF THERMIONIC VALVE.**—The battery by which the filament is electrically heated to incandescence.

133. **FILAMENT OF THERMIONIC VALVE.**—A thin conductor of metal (usually tungsten in modern valves) or carbon which when rendered incandescent emits electrons.

134. **FORCED ALTERNATING CURRENT.**—One produced in *any* circuit by the application of an alternating electromotive force.

135. **FREE ALTERNATING CURRENT.**—That produced by an isolated electrical displacement in a circuit having capacity, inductance, and less than the critical resistance.

136. **FREQUENCY.**—A term used in connection with any form of rhythmical motion or rhythmical change, denoting the number of complete movements or changes in a given time—usually a second.

137. **FREQUENCIES, AUDIO (ABBREVIATED A.F.).**—The frequencies corresponding to the normally audible vibrations. These are assumed to lie below 10,000 cycles per second.

138. **FREQUENCIES, RADIO (ABBREVIATED R.F.).**—The frequencies higher than those corresponding to the normally audible vibrations, which are generally taken as 10,000 cycles per second. See also Frequencies, Audio.

NOTE.—It is not implied that radiation cannot be secured at lower frequencies, and the distinction from audio frequencies is merely one of definition based on convenience.

139. **FREQUENCY CHANGER.**—See Changer, Frequency.

140. **FREQUENCY, GROUP.**—The number per second of periodic changes of amplitude or frequency of an alternating current.

NOTE 1.—Where there is more than one periodically recurrent change of amplitude, or frequency, there is more than one group frequency present.

NOTE 2.—The term "group frequency" replaces the term "spark frequency."

141. **FREQUENCY METER.**—An instrument which indicates frequency.
 142. **FREQUENCY TRANSFORMER.**—See Changer, Frequency.
 143. **FUNDAMENTAL FREQUENCY.**—The lowest frequency to which an electrical circuit will resonate.
 144. **FUNDAMENTAL OF AN ANTENNA.**—This is the lowest frequency of free oscillations of the unloaded antenna. (No series inductance or capacity.)
 145. **FUNDAMENTAL WAVELENGTH.**—The wavelength corresponding to the lowest free period of any oscillator.
 146. **GAP, MICROMETER.**—A device for protecting any apparatus from excessive potentials, and consisting of a short gap designed for fine adjustment.
 147. **GRID OF THERMIONIC VALVE.**—Is a perforated metal electrode by means of which it is possible (by suitable charging) to disturb the state of the electric field between the filament and the metal anode and so control the value of the thermionic current.
 148. **GRID CIRCUIT OF THERMIONIC VALVE.**—The circuit which includes the space in the valve from grid to filament and the path of the external conductor from filament to grid.
 149. **GRID CONDENSER.**—A partially insulated condenser placed in the grid circuit of a thermionic valve which, on account of the approximately unilateral conductivity of the grid circuit, produces asymmetrical variations of anode current for symmetrical applied grid voltage changes.
 150. **GROUND.**—A conductive connection to the earth.
 151. **GROUP FREQUENCY.**—The number of distinguishable alternating current groups occurring per second in an electrical circuit.
- NOTE 1.**—The group referred to above is, in general, mainly a free alternating current which is substantially damped to extinction before the beginning of the following group or train.
- NOTE 2.**—The pitch of the note in the receiving station is, in general, determined by the group frequency at the transmitting station.
- NOTE 3.**—The term "Group Frequency" replaces the term "Spark Frequency."
152. **HARD VALVE.**—A two or three-electrode valve of extreme exhaustion.
 153. **HARMONIC FREQUENCY.**—The harmonics of any particular frequency are generally understood to be all higher frequencies which are odd, or even multiples of the said frequency. An electrical oscillator which has uniformly distributed inductance and capacity (a straight wire nearly fulfils these conditions) will resonate to any odd or even multiple of its fundamental frequency according to whether one end is earthed or not. If the inductance and capacity are not uniformly distributed the circuit may resonate to a number of frequencies higher than its fundamental, but these higher frequencies will not necessarily bear any whole multiple relation to the fundamental frequency.
 154. **HEIGHT, EFFECTIVE, OF AN ANTENNA.**—See Factor, Form ; Note 2.
 155. **HETERODYNE.**—A receiver for continuous waves using the principle of reaction between locally generated oscillations and the received oscillations in order to produce beats.
 156. **HETERODYNE WAVEMETER.**—A valve oscillator the oscillatory circuit of which is calibrated in wavelengths. Syntony between the calibrated and experimental circuits is obtained by tuning until no beats are heard.
 157. **HIGH-FREQUENCY RESISTANCE.**—The resistance offered by a conductor to the passage of high-frequency currents.

It is always greater than the resistance for direct current because of the unequal current distribution over a section of the conductor when carrying high-frequency currents.

158. **HIGH-TENSION BATTERY.**—The battery used in the anode circuit of a thermionic valve.

159. **HYSTERESIS.**—A property of a substance or body by virtue of which an effect produced in a body by changing conditions lags behind the conditions. In the case of iron carried through a magnetic cycle, the magnetisation lags behind the magnetising force.

160. **IMPEDANCE.**—Total opposition to current flow in a circuit in which the current is varying, and is numerically equal to the square root of the sum of the squares of the ohmic resistance and the total reactance of the circuit.

161. **IMPULSE EXCITATION.**—See Excitation, Impulse.

162. **INDUCTANCE.**—That property of a material system by virtue of which it is capable of storing energy electromagnetically.

The inductance of a system is dependent upon its geometrical dimensions and the permeability of the surrounding media. In hysteresis-free circuits inductance is measured by the ratio of the energy stored in the magnetic field surrounding a current-carrying conductor to the square of the current in that conductor, for stationary conditions. In any circuit, it may be measured by the interlinkage with the system itself of magnetic lines of force due to unit current passing through the system. An alternative method involves the measurement of the counter-electromotive force at the terminals of the given conductor when the current through the conductor changes at the rate of one ampere of current per second. In hysteresis-free circuits these three methods of measurement yield identical results.

163. **INDUCTANCE, EFFECTIVE, OF AN ANTENNA.**—See Capacity, Effective, of an Antenna.

164. **INDUCTION COIL.**—A piece of apparatus which makes use of the phenomena of induction to transform an intermittent current of comparatively low voltage to an alternating current of high voltage.

165. **INDUCTIVE COUPLING.**—Two circuits so arranged that some of the magnetic flux of force from one passing through the other circuit are inductively coupled.

166. **INTERFERENCE.**—The interaction of two alternating currents or of electromagnetic waves under conditions such that they oppose each other.

167. **INTERFERENCE (IN RECEPTION).**—The introduction of undesired signals, either from other stations or from Atmospherics (q.v.), into a receiver which is engaged in the reception of a message; often referred to as "jamming."

168. **INTERFERENCE, WAVE (IN RADIO COMMUNICATION).**—The reinforcement or neutralisation of waves arriving at a receiving point along different paths from a given sending station (to be distinguished from ordinary or ordinary interference, which is the simultaneous reception of signals from two or more stations).

169. **IONISATION OF A GAS.**—The breaking away from the molecules of ions contained in them, thus rendering the gas conductive.

Ionisation in gases may be brought about by various ionising agents—X-rays, ultra-violet light, or high-speed electrons.

170. **IONISATION BY COLLISION.**—The liberation of electrons from the atoms of a gas due to the collisions between the atoms and high-speed electrons.

171. **JAMMING.**—See Interference (in Reception).

172. **JIGGER.**—The transformer used in coupled circuits. The primary and secondary form part of the primary and secondary circuits respectively. The transformer has part of the winding common to both primary and secondary, it is called an Auto-Jigger.

173. **KALLIROTRON.**—A form of aperiodic retroactive amplifier consisting of two thermionic valves so connected by pure resistances that a rise of grid potential of either produces a fall of grid potential of the other. The ampli-

cation obtained exceeds the amplification factor of either valve by any desired amount according to the extent of the retroaction.

174. KATHODE.—“(a) In an electrolytic cell. The conductor through the surface of which the current leaves the electrolyte.

“(b) In a primary cell. The conductor (generally carbon) through which the current leaves the electrolyte.

“(c) The electrode by which the current leaves a cell or other apparatus, such as a vacuum tube or thermionic valve.”

175. KEY (MANIPULATING) (OPERATING).—A switch arranged for easy manual operation.

176. KEY, RELAY.—See Relay Key.

177. LENGTH, WAVE.—See Wavelength.

178. LINE OF FORCE.—A curve described in an electric or magnetic field such that the direction of the electric or magnetic force at any point of that curve is a tangent to the curve.

179. LOADING COIL.—A coil possessing self-inductance inserted in an aerial circuit to increase the natural wavelength of the circuit.

180. LOSSES, BRUSH OR CORONA.—See Brush or Corona Losses.

181. LOW-TENSION BATTERY.—See Filament Battery.

182. MAGNETIC FIELD INTENSITY.—The number of lines of force per unit area.

183. MAGNETIC FORCE.—At a point. The force acting on a unit magnetic pole placed at that point. It is numerically equal to the field intensity in a medium of unit permeability.

184. MAGNETIC HYSTERESIS.—That property of a magnetic medium which is measured by the energy losses when the rising and falling (magnetomotive force—induction), *i.e.* (H—B), dynamic characteristics are not identical.

185. MAGNETOMOTIVE FORCE.—A force tending to produce a magnetic flux.

186. MAGNETIC DETECTOR (MARCONI'S).—A detector of oscillations depending on the effect on the hysteresis of iron.

187. MICROPHONE.—A variable resistance, usually in the form of an electrical contact, whose resistance is varied with and in a proportional manner to the movement or pressure of one part. Thus if the movement or pressure is produced by sound waves acting on a diaphragm which is connected to the moving member of the microphone, an electrical current will be produced in the circuit containing the microphone and a battery, whose amplitude varies in a similar manner to the movement of the diaphragm.

188. MUTUAL CONDUCTANCE of a thermionic valve is given by the slope of the grid voltage—anode current characteristic at any operating point.

189. MUTUAL INDUCTANCE of two circuits is the mutual potential energy of the circuits when unit current is flowing in each.

190. NATURAL FREQUENCY.—Is the frequency with which a circuit will oscillate when supplied with energy and then left to itself. If

R = resistance

L = inductance

C = capacity

N = frequency per second

$$\text{then } N = \frac{1}{2\pi} \sqrt{\frac{1}{LC} \frac{R^2}{4L^2}}$$

191. NATURAL FREQUENCY OF ANTENNA.—See Capacity, Effective, of an Antenna.

192. **NOTE OR TONE TUNING.**—A receiver is tuned to the note of the transmitter when a circuit or part of the indicator is designed to resonate to the spark frequency.

193. **OSCILLATING VALVE.**—A thermionic valve in a circuit which is electrically unstable and generating continuous oscillations.

194. **OSCILLATIONS.**—See Alternating Currents, Free and Forced, also Current, Damped Alternating.

195. **OSCILLATOR, ARC.**—See Arc Oscillator.

196. **OSCILLOGRAPH.**—"An apparatus for observing or recording quickly varying currents or potential differences" (B.E.C.).

197. **PERIOD, PERIODIC TIME.**—"Any varying quantity which repeats its values regularly at equal time intervals is said to be periodic, and the time-interval of one repetition is called the periodic time or period" (B.E.C.).

198. **PERMEABILITY of a medium.**—The ratio of the magnetic flux density produced in that medium by a given magnetomotive force to the magnetic flux density produced by the same magnetomotive force in vacuum (or, for practical purposes, in air).

199. **PHASE.**—" (a) In an operation which recurs periodically the stage or state to which the operation has proceeded.

" (b) In an operation which recurs periodically the fraction of the whole period which has elapsed, measured from some fixed origin" (B.E.C.).

200. **PHASE DIFFERENCE.**—"The difference of phase (usually reckoned in time or in angle) between two periodic quantities which vary harmonically. Each of the circuits of a polyphase apparatus is sometimes called a phase" (B.E.C.).

201. **PLAIN AERIAL.**—An early form of transmitter in which the spark gap was placed directly in series with aerial and earth, so that the only condenser in which the energy of the transmitter could be stored was the capacity of the aerial to earth.

The term is also applied to the receiving circuit when the detector is placed directly in series with the receiving aerial and earth.

202. **PLATE.**—See Anode.

203. **PLATE CIRCUIT.**—Is the circuit in a thermionic valve which includes the space in the valve from plate to filament and the path through the external conductors from filament to plate.

204. **PLIODYNATRON.**—A combination of a pliotron and a dynatron, being a four-electrode thermionic tube. The output is controlled by the control grid which is between the filament and the heavier grid-anode.

205. **PLIOTRON.**—A three-electrode valve of extreme exhaustion.

206. **POLARISATION of a wave.**—A wave is said to be plane polarised when its electric and magnetic displacements are confined to two fixed planes at right angles.

When the plane of the electric and magnetic displacement rotates uniformly with time, the waves are said to be circularly or elliptically polarised.

Such waves result from the compounding of two plane polarised waves having the same frequency and line of propagation but different relative phases and polarised in different planes.

207. **POTENTIOMETER.**—An instrument for adjusting at will the potential between any two parts of a circuit.

An instrument for measuring potential difference.

208. **POTENTIAL.**—See Electrical Potential.

209. **POWER.**—The amount of work done in unit time.

210. **POWER, APPARENT.**—In an alternating electric circuit this is the product volts \times amperes.

211. POWER FACTOR.—"The ratio of the watts to the voltamp res. In the case of voltage and current of sine form the power factor is $\cos \phi$ "

(B.E.C.). In an oscillating circuit $\cos \phi = \frac{\delta}{\pi}$ where δ is the decrement.

212. QUENCHED SPARK.—A spark whose duration is shortened by conditions at the discharger designed to increase rapidly the resistance at the spark gap is said to be "quenched."

213. RADIATION RESISTANCE.—The resistance which multiplied by the square of the R.M.S. current in the aerial equals the energy lost by the aerial in radiation.

214. RADIATION, SUSTAINED.—See Waves, Sustained.

215. RADIOGRAM.—A telegram sent by radio.

216. TO RADIOGRAPH (VERB).—To send a radiogram.

217. RADIOTELEPHONE.—An apparatus for the transmission of speech by radio.

218. RADIO PHONE (NOUN).—A telephone message sent by radio.

219. TO RADIOPHONE (VERB).—To send a radiophone.

220. REACTANCE of a circuit is a function of the inductance, capacity, and the impressed frequency.

An inductance has reactance $2 \pi \times \text{frequency} \times \text{inductance}$.

A capacity has reactance

I

$$\frac{1}{2 \pi \times \text{frequency} \times \text{capacity}}$$

An inductance in series with a capacity has reactance equal to the sum of the reactance of the inductance and the reactance of the condenser.

Under conditions of resonance in a circuit the reactance of the capacity neutralises the reactance of the inductance and the resulting reactance is zero.

221. RECTIFIER.—An apparatus for converting alternating or oscillating currents into continuous current, or into pulses of unidirectional current.

RECTIFIER, ELECTRON.—A device for rectifying an alternating current by utilising the approximately unilateral conductivity between a hot cathode and a relatively cold anode in so high a vacuum that a pure electron current flows between the electrodes. See also Kenetron.

222. RECTIFIER, GAS.—An electron rectifier containing gas which modifies the internal action by the retardation of the electrons or the ionisation of the gas atoms.

223. REFLECTION OF ELECTROMAGNETIC WAVES.—(1) When a wave reaches the interface between two media of different dielectric constants its energy does not wholly pass from one medium to the other, but in part remains in the first medium in a reflected wave which travels back from the interface. When the dimensions of the separating surface are large compared with the wavelength the laws of reflection of electromagnetic waves are in general the same as for light.

(2) When waves are being guided by a conductor, such as a wire which has a certain inductance and capacity per unit length, any abrupt change in the value of these constants (such as are produced by inserting an inductance coil, or occur at the end of the wire) causes the production of alternating potentials which result in a wave which travels along the wire in the opposite direction. This second wave is also called a reflected wave.

224. REFRACTION.—The change in the direction of a wave propagation when passing from one medium to another.

225. REGENERATIVE OR RETROACTIVE AMPLIFICATION.—Amplification obtained in a thermionic valve by causing the energy variations of the anode circuit to feed back into the grid circuit and thus increase the voltage operating on the grid.

226. RELAY.—An apparatus by means of which a current, too small to perform a required work, is made to control a larger and adequate current.

227. RELAY, ELECTRON.—A device provided with means for modifying the pure electron current flowing between a hot cathode and a relatively cold anode placed in as nearly as possible a perfect vacuum.

These means may be, for example, an electric control of the pure electron current by variation of the potential of a grid interposed between the cathode and the anode.

228. RELAY, Gas.—An electron relay containing gas which modifies the internal action by the retardation of the electrons or the ionisation of the gas atoms.

229. RELAY KEY.—An electrically operated key. See further, Key.

230. RESISTANCE.—The measure of that property of a conductor by the action of which electrical energy is transformed into heat in that conductor. It is numerically equal to the ratio of the heat energy liberated per second, measured in watts, to the square of the current in the circuit, for stationary conditions; it is also equal to the ratio of the applied electromotive force to the resulting current, both being constant.

231. RESISTANCE, ANTENNA.—See Antenna Resistance.

232. RESISTANCE, CRITICAL, OF A CIRCUIT.—That resistance which determines the limiting condition at which the oscillatory discharge of a circuit passes into an aperiodic discharge.

233. RESISTANCE, EFFECTIVE, OF A SPARK.—The ratio of the power dissipated by the spark to the mean square current.

234. RESISTANCE, RADIATION.—This is the ratio of the total energy radiated (per second) by the antenna to the square of the R.M.S. current at a potential node (generally the ground connection). See further, Antenna, Resistance.

235. RESISTANCE, RADIO FREQUENCY.—This is the ratio of the heat produced per second in watts to the square of the R.M.S. current (R.F.) in amperes in a conductor.

236. RESONANCE.—Resonance of a circuit to a given exciting alternating E.M.F. is that condition due to variation of the inductance or capacity in which the resulting effective current (or voltage) in that circuit is a maximum.

NOTE 1.—Instead of varying the inductance and capacity of a circuit the frequency of the exciting field may be varied. The condition of resonance is determined by the frequency at which the current (or voltage) is a maximum.

NOTE 2.—The resonance frequency corresponds the more accurately to the frequency of the free oscillations of a circuit, the lower the damping of the exciting alternating field and of the excited circuit.

A circuit will resonate to an impressed frequency when the reciprocal of 2π times the square root of the product of inductance and capacity is equal to the impressed frequency and provided that its resistance is less than the critical resistance. Under conditions of resonance the amplitudes of successive half-periods of the resultant current gradually increase to a maximum which is dependent only on the impressed electromotive force and the resistance of the circuit, including radiation.

237. RESONANCE, ACOUSTIC DEVICE.—See Device, Acoustic Resonance.

238. RESONANCE CURVE.—A curve showing the relation between the current or voltage induced in an oscillatory circuit and the inducing frequency.

239. RESONANCE, SHARPNESS OF.—See Tuning, Sharpness of.

240. RETROACTIVE AMPLIFICATION.—See Regenerative Amplification.

241. ROOT-MEAN-SQUARE VALUE.—R.M.S. value of an alternating or oscillating current or voltage is the value given by the square root of the mean of the squares of the successive values throughout the half-period.

In a current or voltage of strict sine-wave form (sinusoidal) the R.M.S. value is equal to the maximum multiplied by $\frac{1}{\sqrt{2}}$ —i.e., $(1/\sqrt{2})$. The R.M. value is also called the effective or virtual value.

242. **SELECTIVITY.**—The power of a receiving system to discriminate between a number of simultaneous signals.

243. **SELF-INDUCTANCE** of a circuit.—That portion of the inductance which is due to the magnetic field produced by the current in that circuit. See also Inductance.

244. **SHARPNESS OF TUNING.**—The measure of the rate of diminution of current in transmitters and receivers with detuning of the circuit which is varied.

If d_1 is the decrement of the free alternating current in the circuit and d_2 the decrement of the exciting E.M.F., then the sharpness of tuning is arbitrarily defined as $\frac{\pi}{d_1 + d_2}$.

In the case of continuous oscillations this reduces to $\frac{\pi}{d_2}$.

245. **SHEATH.**—The anode or plate of a thermionic valve.

246. **SHOCK EXCITATION.**—A name given to the method of exciting oscillations in the aerial circuit by a sudden and very short transference of energy from another circuit.

247. **SHORTENING CONDENSER.**—A condenser inserted in series with an aerial circuit to decrease the natural wavelength of the circuit.

248. **SKIN EFFECT OF VARYING CURRENTS.**—The non-uniform current density through the cross-section of the conductor. It is greatest at the surface and least at the centre.

249. **SOFT VALVE.**—A two or three-electrode valve containing an appreciable amount of gas.

250. **SPACE CHARGE.**—The electric charge possessed by the electrons or positive ions situated in the vacuous space between the electrodes of a discharge tube or thermionic valve.

251. **SPARK.**—An electrical discharge across a gap. It may consist of one discharge in either direction, but generally consists of a number of rapid oscillatory discharges.

252. **SPECIFIC INDUCTIVE CAPACITY.**—See Dielectric Constant.

253. **STATIC.**—Disturbances caused by atmospheric charging of the antenna.

NOTE.—When it is definitely known that disturbances are due to atmospheric charging of the antenna, the word "Static" is used. In general, disturbances are called "Strays."

254. **STRAYS.**—Electromagnetic disturbances set up by distant charges.

255. **SYNTONY AND SYNTONISATION.**—The adjustment of one circuit to another, or of one transmitter taken as a whole to one receiver taken as a whole, in such a way that their time-periods are the same and waves of a different time-period produce little or no effect on the system.

256. **TELEGRAPHY, RADIO.**—The art of sending and receiving radiograms.

257. **TELEPHONY, RADIO.**—The art of sending and receiving radiophones.

258. **THERMIONIC CURRENT.**—The current passing through a vacuous space and consisting of electrons or ions emitted by an incandescent electrode.

259. **THERMIONIC VALVE.**—A vacuum tube with incandescent filament and auxiliary electrodes which may function as an amplifier, detector or generator of electrical oscillations.

260. **TICKER, TIKKER.**—A rapid make-and-break device used in conjunction with a resonant circuit and a pair of telephones as a receiver for

continuous waves. It discharges the condenser of the resonant circuit at every make. The speed of the make-and-break device has no relation to the wave frequency.

261. **TONE WHEEL.**—A high-speed commutator used as a receiver for continuous waves. It is run at a speed slightly different from the synchronous speed for the wave frequency and in effect converts the high-frequency current into a current of audible frequency.

262. **TRAIN OF WAVES.**—The waves produced by one discharge of the primary condenser in a spark circuit.

263. **TRANSFORMER.**—A stationary induction apparatus for transferring energy from one circuit to another by the medium of magnetic energy.

It may or may not transform the current into another current at different potential. In present radio practice the term should be restricted to audio frequency transformers. See Frequency, Audio.

264. **TRANSMISSION, DIPLEX.**—See Diplex Transmission.

265. **TUNER.**—An apparatus made in a convenient form, which in conjunction with a detector provides all necessary circuits and adjustments for selective tuning.

266. **TUNING.**—The process of securing the maximum indication by adjusting the time period of a driven element. See Resonance.

267. **TUNING, SHARPNESS OF.**—See Sharpness of Tuning.

268. **UNDAMPED WAVES.**—See Continuous Waves.

269. **VACUUM TUBE, THREE ELECTRODE.**—As examples see Relays, Electron and Gas.

270. **VACUUM TUBE, TWO ELECTRODE.**—As examples see Rectifiers, Electron and Gas.

271. **VALVE, FLEMING.**—A detector for oscillations. It depends on the rectifying properties of the ionised space between a hot filament and a cold electrode in an exhausted vessel.

272. **VALVE, THERMIONIC.**—See Thermionic Valve.

273. **WAVES, ELECTROMAGNETIC.**—A periodic electromagnetic disturbance progressive through space.

274. **WAVELENGTH.**—Twice the distance (taken in the line of propagation of the wave) between two successive points of zero disturbance; or the distance between two consecutive maxima, of the same sign. The wavelength is numerically equal to the velocity of the waves divided by the frequency.

275. **WAVELENGTH (OF AN ELECTROMAGNETIC WAVE).**—The distance in metres between two consecutive maxima of the same sign. The wavelength is numerically equal to the velocity of the waves (3×10^{10} cms. per second) divided by their frequency.

276. **WAVELENGTH, FUNDAMENTAL.**—See Fundamental Wavelength.

277. **WAVELENGTH, NATURAL.**—In a loaded antenna (that is, with series inductance or capacity) the natural wavelength corresponds to the slowest free oscillation.

278. **WAVE CHANGER.**—See Changer, Wave.

279. **WAVEMETER.**—A radio frequency measuring instrument calibrated to read wavelengths.

280. **WAVES SUSTAINED.**—Waves radiated from a conductor in which an alternating current flows.

281. **WAVE TRAIN.**—See Train of Waves.

282. **WING CIRCUIT.**—See Anode Circuit.

(B) Foreign Equivalents.

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Accumulator batteries	Batterie d'accumulateurs	Batterie di accumulatori	Acumuladores, Baterias de	Accumulatoren Batterie
Aerial, balancing	Antenne de compensation	Antenna di compensazione	Antena compensadora	Wage Antenne
Aerial, directional	Antenne dirigée	Antenna dirigibile	Antena dirigida	Gerichtete Antenne
Aerial, direction finder	Antenne réception dirigée	Antenna, rivelatrice della direzione	Antena para busca de direcciones	Antenne, zur Entdeckung der Richtung
Aerial, horizontal	Antenne horizontale	Antenna orizzontale	Antena horizontal	Horizontaler Luftleiter
Aerial, receiving	Antenne de réception	Antenna di ricezione	Antena de recepcion	Empfangsdraht
Aerial, transmitting	Antenne d'émission	Antenna di trasmissione	Antena de transmission	Gebirah (Sendeluftleiter)
Aerial, umbrella	Antenne en parapluie	Antenna a forma di ombrella	Antena de paragua en forma	Schirmnetz
Alternator	Alternateur	Alternatore	Alternador	Wechselstrom Generator
Alternator, high-frequency	Alternateur à haute fréquence	Alternatore ad alta frequenza	Alternador de alta frecuencia	Hochfrequenz Generator
Ammeter, a.c.	Ampermètre pour courant alternatif	Amperometro per corrente alternata	Amperímetro, c.a.	Wechse stromamperemeter
Ammeter, d.c.	Ampermètre pour courant continu	Amperometro per corrente continua	Amperímetro, c.c.	Gleichstromamperemeter
Ammeter, hotwire	Ampermètre à fil chaud	Amperometro a filo caldo	Amperímetro térmico	Hitzdrahtamperemeter
Ammeter, moving coil	Ampermètre d'Arsonval	Amperometro a bobina mobile	Amperímetro de bobina móvil	D'Arsonval'scher Amperemeter
Amplifier, thermionic	Amplificateur à lampes	Divisorio di angoli	Divisor de Angulo	Vakuum-röhren Verstärker
Angle divider	Diviseur d'angle	Anodica	—	Winkel Trennungs-Apparat
Anode	Anode	Antenna	Antena	Anod
Antenna	Antenne	Fili orizzontali dell'antenna	Antena, Prolongación horizontal de la	Luftleiter (Antenne)
Antenna, horizontal extension of	Branch horizontale de l'antenne	Antenna a forma di T	Antena en forma de T	Horizontale Verlängerungsdrähte des Luftleiters
Antenna, T-shaped	Antenne en T	Antenna a forma di T allungata	Antena en forma de T prolongada	T. formige Antenne
Antenna, extended T-shaped	Antenne en T, à branches horizontales prolongées	Apparecchi di ricezione	Aparatos receptores	Verlängerte T. Luftleiter
Apparatus, receiving	Appareils de réception	Apparecchi di trasmissione	Aparatos transmisores	Empfänger
Apparatus, transmitting	Appareils de transmission	—	—	Sender
Arrester, earth terminal	Eclateur de mise à terre	Morsetto per presa di terra	Espacio de chispa de tierra	Unterbrochener Erdschluss
Arrester, lightning	Parafoudre	Dispositivo scaricafulmine	Pararrayos	Blitzschutz
Atmospheres	Perturbations atmosphériques	Perturbazioni atmosferiche	Perturbaciones atmosféricas	Luftstörungen
Audio frequency	Haute fréquence	Alta frecuencia	Alta frecuencia	Hochfrequenz

Battery of Leyden jars	Batterie de bouteilles de Leyde	Batteria di bottiglie di Leyda	Bateria de Botellas de Leyden	Batterie Leydener Flaschen
Beats (Heterodyne)	Sons de battements	Campanello di chiamata	Timbre de llamada	Iockklingel
Bell, call-	Sonnerie d'appel	Ventilatore ad azionamento elettrico	Motor soprador or Ventilador electrico	Geblaese, mit Elektrischen Antrieb
Blower, electric motor	Soufflerie à moteur électrique	Barre collettrici principali	Barras colectoras principales	Haupt Sammelschienen
Busbars, main-	Barres omnibus principales	Fabbricato della stazione	Edificio de la estación	Stationhaus
Building, station-	Bâtiment du poste radio-télégraphique	Vibratore	Zumbador	Summer
Buzzer	Vibrateur	Cicala per la pratica della ricezione a udito	Zumbador para prácti	Übungssummer
Buzzer, practice	Vibrateur d'apprentissage			
Capacity	Capacité	Capacità	Capacidad	Aufnahmefähigkeit
Capacity earth	Contrepoids	Capacità di terra	Capacidad de tierra	Gegengewicht
Cart, radiotelegraph	Voiture radiotélégraphique	Carro radiotelegrafico	Carro de radiotelegrafia	Funkenkarren
Cathode, incandescent	Cathode incandescente	Catodo incandescente	Cátodo incandescente	Glimmende Kathode
Change of connections for receiving	Commutation pour la réception	Commutazione per ricezione	Cambio de conexiones para la recepción	Umschaltung auf Empfangen
Change of connections for transmitting	Commutation pour la transmission	Commutazione per trasmissione	Cambio de conexiones para la transmisión	Umschaltung auf Senden
Chokes, air core protecting	Bobine de réactance sans noyau de fer	Bobine di protezione a nucleo d'aria	Bobinas de reactancia, de aire	Impedanzspulen für hohe Frequenz mit Luftkern
Choking coil	Bobine d'impédance	Rocchetto d'autoinduzione	Bobina de reactancia	Drosselspule
Circuit breaker and closer	Disjoncteur et conjointeur automatique	Interruttore	Interruptor con apertura y cierre automáticos	Strom - unterbrecher und Strom-schliesser
Circuit, closed oscillating	Circuit oscillant fermé	Circuito oscillante chiuso	Circuito oscilante cerrado	Geschlossener Erregerkreis
Circuit, intermediate	Circuit intermédiaire	Circuito intermedio	Circuito intermedio	Zwischenkreis
Circuit, open radiating	Circuit radiant ouvert	Circuito radiante aperto	Circuito radiador abierto	Offener Strahlungskreis
Circuit, oscillatory	Circuit oscillatoire	Circuito oscillante	Circuito oscilante	Schwingungskreis
Coherer	Coherer	Ricevitore a coherer	Cohesor	Fritterempfangler
Coil, syntonising	Inductance de syntonisation	Rocchetto di syntonizzazione	Bobina de syntonización	Abstimmspule
Commutator	Commutateur	Commutatore	Commutador	Stromwender
Commutator (of Dynamo)	Collecteur	Collettore	Colector	Stromwender
Condensers	Condensateurs	Condensatori	Condensadores	Kondensatoren
Condenser, adjustable	Condensateur réglable	Condensatore regolabile	Condensador variable	Variabler Kondensator
Condenser, adjustable disc	Condensateur à disque	Condensatore a disco regolabile	Condensador de disco, variable	Drehkondensator
Condenser, aerial tuning	Condensateur de syntonisation d'antenne	Condensatore per la syntonizzazione dell' antenna	Condensador de syntonización de la antena	Kondensator zur Luftleiterabstimmung

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Condenser, air . . .	Condensateur à air . . .	Condensatore ad aria . . .	Condensador de dialéctrico de aire . . .	Luftkondensator
Condenser, calibration . . .	Condensateur étalon . . .	Condensatore per taratura . . .	Condensador para calibración . . .	Eichungskondensator
Condenser, circuit . . .	Circuit du condensateur . . .	Circuito del condensatore . . .	Condensador, Circuito de . . .	Kondensatorkreis
Condenser, intermediate circuit . . .	Condensateur du circuit intermédiaire . . .	Condensatore per il circuito intermedio . . .	Condensador del circuito intermedio . . .	Kondensator im Zwischenkreis
Condenser, secondary circuit . . .	Condensateur du circuit secondaire . . .	Condensatore per il circuito secondario . . .	Condensador del circuito secundario . . .	Kondensator im Sekundärkreis
Condenser, short wave . . .	Condensateur de raccourcissement . . .	Condensatore per onda corta . . .	Condensador de onda corta . . .	Verkürzungskondensator
Condenser-system . . .	Système de condensateur . . .	Sistema di condensatori . . .	Sistema de Condensadores . . .	Kondensatorsystem
Condensers, test-tube . . .	Condensateurs à tube . . .	Condensatori tubolari . . .	Tubo para ensayo de condensadores . . .	Kondensator Prüfröhre
Condenser, twin-coupled . . .	Condensateur jumelé . . .	Condensatore a doppio accoppiamento . . .	Condensador de doble acoplamiento . . .	Kondensator, doppelt geschaltete
Condensers, variable . . .	Condensateurs réglables . . .	Condensatori variabili . . .	Condensadores variables . . .	Variablerkondensatoren
Converter . . .	Commutatrice . . .	Convertitore . . .	Convertidor . . .	Drehumformer
Continuous wave . . .	Onde entretenue . . .	Onda continua . . .	Onda continua . . .	Kontinuierliche Welle
Continuous wave receiver . . .	Recepteur pour ondes entretenues . . .	Ricevitore d'onde non smorzata . . .	Receptor para onda continua . . .	Empfänger fuer kontinuierliche Welle
Coupling . . .	Couplage . . .	Accoppiamento . . .	Acoplamiento . . .	Kopplung
Couplings, flexible and insulating . . .	Manchons d'accouplement souples et isolants . . .	Accoppiamenti elastici ed isolanti . . .	Acoplamientos flexibles y aisladores . . .	Biegsame und isolierende Verbindungen
Current, alternating . . .	Courant alternatif . . .	Corrente alternata . . .	Corriente alterna . . .	Wechselstrom
Current, direct . . .	Courant continu . . .	Corrente continua . . .	Corriente continua . . .	Gleichstrom
Current, primary alternating . . .	Courant alternatif primaire . . .	Corrente alternata del circuito primario . . .	Corriente alterna primaria . . .	Primär Wechselstrom
Cut-out, automatic . . .	Interrupteur automatique . . .	Interruttore automatico . . .	Interruptor automático . . .	Selbstunterbrecher
Cymometers . . .	Cymomètres . . .	Cimometri . . .	Cinómetro . . .	Wellenmesser
Damper . . .	Sourdine . . .	Sordina . . .	Amortiguador . . .	Dämpfer
Damping, high . . .	Amortissement élevé . . .	Forte smorzamento . . .	Amortiguamiento, Gran . . .	Grosse Dämpfung
Dekrometer . . .	Décrimètre . . .	Décrimetro . . .	Décrimetro . . .	Dekrometer (Dampfungs-)
Detector, crystal . . .	Détecteur à cristal . . .	Rivelatore di onde a cristallo . . .	Detector de cristal . . .	Kristalldetektor
Detector, magnetic . . .	Détecteur "Fleming" . . .	valvola di Fleming . . .	Fleming . . .	Empfänger
Detector, magnetic . . .	Détecteur magnétique . . .	Rivelatore di onde magnetica . . .	Detector magnético . . .	Marconi-Magnetdetektor

Discharger, asynchronous.	Eclateur asynchrone .	Scaricatore asincrono .	Descargador asincrono .	Scheibenfunkenstrecke, asynchron
Discharger, disc, high-speed	Eclateur à disque à grand-vitesse	Scaricatore a disco ad alta velocità	Descargador de disco de gran velocidad	Schnell rotierende Scheibenfunkenstrecke
Discharger, disc, smooth .	Eclateur à disque uni .	Scaricatore a disco a con-torni lisci	Descargador de discoliso	Rotierende Scheibenfunkenstrecke-glatt
Discharger, disc, studded .	Eclateur à disque—muni de prisonniers latéraux	Scaricatore a disco con punte	Descargador de disco dentado	Rotierende Scheibenfunkenstrecke mit Zähne
Discharger, fixed .	Eclateur fixe	Scaricatore fisso .	Descargado fijo .	Scheibenfunkenstrecke, fixierter
Discharger, micrometric spark	Eclateur à étincelle micrométrique	Scaricatore per la produzione di scintilla micrometrica	Descargador de chispa micrométrica	Mikrometerfunkenstrecke
Discharger, side electrodes	Eclateur à électrodes latérales	Scaricatore con elettrodi laterali	Descargador, electrodos laterales del	Scheibenfunkenstrecke, Seiten electrodeen
Discharger, synchronous .	Eclateur synchrone	Scaricatore sincrono .	Descargador sincrono .	Scheibenfunkenstrecke, synchron
Duplex telegraphy .	Télégraphe duplex .	Telegrafia duplex .	Telegrafia duplex .	Duplex Telegraphie
Earth connection .	Connexion de terre	Messa a terra .	Conexión de tierra .	Erd Verbindung
Efficiency .	Rendement	Rendimento .	Rendimiento .	Wirkungsgrad
Electromagnetic coupling	Couplage électromagnétique	Accoppiamento elettromagnético	Acoplamiento electromagnético	Electromagnetische Kopplung
Electron emission .	Emission d'électrodes	Emissione elettronica .	Emisión de electrones .	Electronenemission
Electrostatic coupling	Couplage électrostatique	Accoppiamento elettrostatico	Acoplamiento electrostatico	Electrostatiche Kopplung
Filament battery .	Batterie des filaments	Batteria d'accensione dei filamenti	Bateria de filamento	Heizbatterie
Frequency, high .	Haute fréquence	Alta frecuencia .	Frecuencia, alta .	Hochfrequenz
Frequency, low .	Basse fréquence	Bassa frecuencia .	Frecuencia, baja .	Niedfrequenz
Frequency meter .	Fréquencemètre	Frequenziometro .	Frecuencimetro .	Frequenzmesser
Generating plant	Générateur	Impianto generatore	Instalación generadora .	Stromanlage
Generator, c.c.	Dynamo .	Generatore di corrente continua	Generador de corriente continua	Dynamo (Gleichstrom)
Grid .	Grille .	Griglia .	Rejilla .	Gitter

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Grid circuit	Circuit de grille	Circuito di griglia	Circuito de rejilla	Gitter Kreis
Grid leak	Shunt de grille	Circuito di dispersione di griglia	Derivación de rejilla	Gitter Ableitung
Group frequency	Fréquence des trains d'ondes	Frequenza delle scintille	Frecuencia de tren	Gruppen frequenz
Hammer-break, magnetic	Interrupteur à marteau	Interruttore magnetico a martello	Interruptor magnético de martillo	Magnetischer Hammerunterbrecher
Heterodyne	Hétérodyne	—	—	Heterodyn
Heterodyne receiver	Hétérodyne	Ricevitore a eterodina	Receptor heterodino	Überlagerungs Empfänger
Impedance	Impédance	Impedenza	Impedancia	Scheinbarer Widerstand
Inductance, aerial	Inductance d'antenne	Induttanza dell' antenna	Induttancia de antena	Antenneninduktanz
Inductance, aerial tuning	Inductance à synchroniser le circuit de l'antenne	Induttanza per la sintonizzazione dell' antenna	Induttancia de sintonización de la antena	Induktanz zum Synchronisieren der Antenne
Inductance, low frequency	Bobine d'inductance du circuit à basse fréquence	Induttanza per il circuito a bassa frequenza	Induttancia del circuito de baja frecuencia	Induktanzspule niedriger Frequenz
Inductance, primary	Inductance primaire	Induttanza per circuito primario	Induttancia primaria	Primärinduktanz
Inductance, primary synchronising	Inductance primaire de synchronisation	Induttanza sintonizzatrice del circuito primario	Induttancia primaria de sintonización	Primärinduktanz zum Abstimmen
Inductance, variable primary synchronising	Inductance primaire variable de synchronisation	Induttanza sintonizzatrice del circuito primario, regolabile	Induttancia variable de sintonización del primario	Veränderliche Primärinduktanz zum Abstimmen
Induction coil	Bobine d'induction	Rocchetto d'induzione	Bobina de inducción	Rhunkorffscher Funkeninduktor
Inkwriter, Morse	Appareil Morse enregistreur	Ricevitore scrivente Morse	Aparto Morse registrador	Schreibempfänger
Insulation	Isolation	Isolamento	Aslamiento	Isolierung
Insulation resistance	Résistance d'isolation	Resistenza d'isolamento	Resistencia de aislamiento	Isolation Widerstand
Insulator, leading-in	Isolateur d'entrée	Isolatore d'entrata	Aslador de entrada	Isolator, Einführungs
Insulator, flexible	Isolateur souple	Isolatore elastico	Aslador flexible	Flexibler Isolator
Insulator, receiving	Isolateur de réception	Isolatore dell' antenna di ricezione	Aslador para circuito receptor	Isolator für den Empfänger
Interrupter, electrolytic	Rupteur électrolytique	Interruttore elettrolitico	Interruptor electrolítico	Quecksilberturbine
Interrupter, turbine	Turborupteur à mercure	Interruttore a turbina	Interruptor de turbina	Weltweit Unterbrecher

Jigger, balanced	Jigger compensé	Trasformatore ad alta frequenza compensato	Jigger compensador	Jigger, bilanziato
Jigger, primary	Primaire de transformateur d'oscillation	Circuito primario del trasformatore delle correnti oscillatorie	"Jigger," primario del	Primär-Jigger
Jigger, secondary	Secondaire de transformateur d'oscillation	Circuito secundario del trasformatore delle correnti oscillatorie	"Jigger," secundario del	Sekundär-Jigger
Key-sending	Manipulateur	Tasto manipolatore di trasmissione	Manipulador	Taste
Lamp, tuning—and choke	Lampe de Syntonisation avec bobine de réactance	Lampada di sintonizzazione con bobina	Lámpara de sintonización y de reactancia	Syntonisierlampe mit Indepedanz
Leyden jar	Bouteille de Leyde.	Bottiglia di Leyda.	Botella de Leyden.	Leydener Flasche
Leyden jar, battery of	Batterie de bouteilles de Leyde	Batteria di bottiglie di Leyda	Botellas de Leyden, Bateria de	Batterie Leydener Flaschen
Lightning arrester. (See Arrester, lightning)	Self de syntonisation	Induttanza d'aereo	Inductancia adicional	Verlängerung Spule
Loading coil	Amplificateur à transformateurs	Amplificatore magnetico	Amplificador magnético	Magnetische Verstärker
Magnetic amplifier	Mât, portatif	Abero, portatile	Mástil, portátil	Tragbarer Mast
Mast, portable	Mâts d'acier à sections	Abero di acciaio diviso in sezioni	Mástil de secciones de acero	Stahlmasten in Teilen
Masts, steel sectional	Mât, télescopique	Abero telescopico	Mástil telescópico	Teleskopmast
Mast, telescopic	Microphone	Microphono	—	Microphon
Microphone	Appareil microphone	Apparecchio microfonico	Aparato microfónico	Microphon-Apparat
Microphone apparatus	Micromètre à étincelle	Micrometro per Scintilla	Micrometro de chispa	Funkmikrometer
Micrometer, spark	Groupe moteur alternatif avec éclateur à disque	Gruppo convertitore con scaricatore a disco	Grupo de motor, alternador con estallador de disco	Wechselstromgenerator kombiniert mit Rotierende Funkenstrecke
Motor alternator disc set	Antenne multiple	Antenna multipla	Antena múltiple	Mehrfache Antenne
Multiple antenna	Transmission et réception multiples	Trasmisionee Ricezione multipla	Transmisión y recepción múltiple	Viel-fach Übermittlung und Empfang
Multiple transmission and reception	Oscillations électriques	Oscillazioni elettriche	Oscilaciones eléctricas	Elektrische-Schwingungen
Oscillations, electric.	Oscillateur à lampes	Oscillatore a lampes	—	Röhre sender
Oscillating valve				

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Oscillatory circuit . . . Overload . . .	Circuit oscillant . . . Surchage . . .	Circuito oscillante . . . Sovraccarica . . .	Circuito oscilante . . . Sobrecarga . . .	Schwingungs Kreis Überlast
Plant, radiotelegraphic . . . Plate . . . Plate circuit . . . Potentiometer . . .	Installation radiotélé- graphique . . . Plaque, Anode . . . Circuit de plaque . . . Potentiometre . . .	Impianto radiotelegrafico . . . Anodica . . . Circuito di piastra . . . Potenziometro . . .	Instalación radiotelegrá- fica . . . Circuito de placa . . . Potenciómetro . . .	Radiotelegraphische An- lage . . . Anod, Platte . . . Anoden Kreis . . . Potentiometer . . .
Radiating antenna . . . Radio frequency . . .	Antenne transmettrice . . . Haute fréquence . . .	Antenna irradiante . . . Frequenza radiotele- grafica . . .	Antena radiadora . . . Frecuencia radio . . .	Strahlende Antenne . . . Radio frequenz
Radiogoniometer . . . Range . . . Reactance . . . Reaction coupling . . . Receiver . . . Receiver arrangement . . . Receiver, balanced . . . Receiver, flexible . . . Receiver, vacuum valve . . .	Radiogoniomètre . . . Portée . . . Réactance . . . Couplage des réactions . . . Appareil récepteur . . . Dispositif de réception . . . Récepteur compensé . . . Récepteur souple . . . Récepteur à valve d'oscil- lation . . . Rectificateurs . . . Relais . . . Relais pour haute tension . . .	Radiogoniometro . . . Portata . . . Reattanza . . . Accoppiamento di reazioni . . . Apparecchio ricevitore . . . Dispositivo di ricezione . . . Rivelatore compensato . . . Ricevitore flessibile . . . Ricevitore con valvola a vuoto . . . Raddrizzatori di corrente . . . Soccorritore . . . Soccorritore ad alta ten- sione . . .	Radiogoniometro . . . Alcance . . . Reactancia . . . Acoplamiento de reacción . . . Receptor . . . Dispositivo de recepción . . . Receptor compensador . . . Receptor flexible . . . Receptor de válvula de vacío . . . Rectificador . . . Relevador . . . Relevador A.T. . .	Reichweite . . . Inductive Widerstand . . . Rück Kopplung . . . Empfänger . . . Empfangsvorrichtung . . . Empfänger, balancierter . . . Empfänger . . . Vakuum ventil Empfänger . . . Ausgleicher . . . Relais . . . Hochspannungsrelais . . .
Relay magnets . . . Resistance, high . . . Resistance, low . . . Resistance, starting . . . Resistance regulating . . . Room, accumulator . . . Room, operating . . . Room, transmission . . .	Aimants du relais . . . Haute résistance . . . Basse résistance . . . Rhéostat de démarrage . . . Rhéostat de champ . . . Salle des accumulateurs . . . Salle de manipulation et de réglage . . .	Magneti di soccorritore . . . Alta resistenza . . . Bassa resistenza . . . Reostato di avviamento . . . Reostato di campo . . . Stanza per la batteria di uffici radiotelegrafici . . .	Imanes del relevador . . . Resistencia, alta . . . Resistencia, baja . . . Reostato de arranque . . . Resistencia de regulación . . . Sala de los acumuladores . . . Sala telegráfica . . .	Relais-magnete . . . Hoher Widerstand . . . Niedriger Widerstand . . . Anlasser . . . Reglerwiderstand . . . Akumulatorenraum . . . Bedienungsraum für die Fernschaltung . . .
Screening box . . . Series rheostat . . . Ship station . . .	Rhécostat en serie . . . Station de bord . . .	Cassette di protezione . . . Reostato in serie . . . Stanza di bordo . . .	Caja de resguardo . . . Reostato en serie . . . Estación de a bordo . . .	Schutzzkasten . . . Serien Widerstand . . .

Shunt, highly inductive	Rheostat en serie	Reostato en serie	Series Widerstand
Shunt, non-inductive	Station navale	Estación de a bordo	Schiffstation
Signals, balancing	Dispositif de mise en court circuit	Dispositivo de corto circuito	Kurzschliesser
Signals, telephone	Shunt à pouvoir inductif élevé	Shunt alta induzione	Shunt mit hohe Selbstinduktion
Span	Shunt, non-inductif	Circuito in derivazione non-induttivo	Nebenschluss
Spark	Signaux téléphoniques	Segnali equibrati	Balanciersignale
Spark coil, with hammer-break	Haubanage	Segnali del telefono	Telephonsignale
Spark gap	Étincelle	Campata	Abspannung
Spark gap, micrometric	Étincelle étouffée	Scintilla	Funkenspannung
	Bobine d'induction à interrupteur à intervalle	Rochetto d'induzione a martello	Funkenduktor mit Hammerunterbrecher
	Eclateur à étincelle	Oscillatore	Funkentrecke
	Eclateur à intervalle micrométrique	Oscillatore micrometrico	Micrometer Funkentrecke
Spark micrometer	Micromètre à étincelles	Micrometro di scintilla	Funkennikrometer
Spark gap, multiple	Eclateur en série	Oscillatore multiplo	Unterteilte Funkentrecke
Spark gap, quenched	Eclateur pour étincelle étouffée	Spinterometro per oscillazioni smorzate	Gedaempfte Funkentrecke
Sparking distance	Étincelle étouffée	Scintilla smorzata	Löschfunke
Specific inductive capacity	Distance explosive	Distanza esplosiva	Funkentrecke
	Capacité inductive spécifique	Capacità inductiva specifica	Dielectricitäts Konstante
Starter, automatic	Démarréur, automatique	Avviatore automatico	Selbstanlasser
Starter, combined with shunt regulator	Rhéostat de démarrage avec rhéostat de champ	Reostato di avviamento combinato con regolatore in derivazione	Anlasswiderstand mit Nebenschlussregler
Starter, single-phase	Démarréur monophasé	Avviatore per corrente monofase	Einphasenanlasser
Starter, three-phase	Démarréur tri-phasé	Avviatore per corrente trifase	Dreiphasenanlasser
Station, aeroplane	Aéroplane (poste d')	Station per aeroplano	Flugzeug Station
Station, airship	Station de ballon dirigeable	Station per aeromobile	Luftschiffstation
Station, cart type	Station du type sur voiture	Stazione del tipo su carri	Karren station
Station, cavalry	Poste de cavalerie	Stazione per cavalleria	Kavallerestation
Station, high-power	Station à grande puissance	Stazione di grande potenza	Kraftstation
Station, knapsack	Poste de harnais	Stazione da zaino	Tornierstation
Station, landing	Poste de débarquement	Stazione da sbarco	Landungsstation
Station, long-distance	Poste de grandes distances	Stazione ultrapotente	Radiotelegraphische Grosstation
Station, portable	Station portative	Stazione portatile	Tragbarestation

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Station, portable military.	Poste militaire transportable	Stazione militare mobile.	Estación militar portátil.	Tragbare Militärstation
Station, radiotelegraph.	Poste radiotélégraphique	Stazione radiotelegrafica	Estación radiotelegráfica.	Funkensamt
Station, small-power.	Station à faible puissance	Stazione di piccola potenza	Estación de pequeña potencia	Kleinstation
Swiss commutator.	Commutateur suisse	Commutatore tipo svizzero	Commutador suizo.	Schweizerische Kommutator
Switch, aerial change-over	Commutateur d'antenne.	Commutatore dell'antenna	Commutador para cambio de hilos de antena	Luftdrahtumschalter
Switch, aerial heating	Commutateur, échauffement d'antenne	Interruttore per riscaldamento dell'antenna	Commutador de seguridad contra calentamiento de la antena	Umschalter zum heizen der Antenne
Switch, automatic.	Interrupteur automatique	Interruttore automatico.	Interrupor automático.	Selbsttaetiger Schalte
Switch, automatic field break	Interrupteur automatique d'excitation	Interruttore automatico di eccitazione	Interrupor automático del campo	Selbsttaetiger Magnet-ausschalter
Switch, carbon break	Interrupteur à contacts de charbon	Interruttore a carbone.	Interrupor con contactos de carbón	Kohlenschalter
Switch, change-over	Commutateur	Commutatore	Commutador.	Umschalter
Switch, change-tune	Commutateur de longueurs d'ondes	Commutatore di sintonizzazione	Commutador de sintonización	Wellenumschalter
Switch, charging	Interrupteur de charge	Interruttore di carica.	Commutador de carga.	Ladeschalter
Switch, combined fuse and circuit	Interrupteur avec coupe circuit	Fusible ed interruttore combinati	Interrupor con fusible.	Schalter und Sicherung-kombiniert
Switch, double-bladed knife	Interrupteur bipolaire à lames	Interruttore doppio a coltello	Interrupor de cuchillo, bipolares	Doppelmesserschalter
Switch, double-pole.	Interrupteur bipolaire	Interruttore bipolare	Interrupor bipolar	Zweipoliger Schalter
Switch, double pole, double throw	Commutateur bipolaire à deux directions	Interruttore bipolare a doppio effetto	Commutador bipolar de dos posiciones	Zweipoliger Umschalter
Switchboard, d.c. and a.c.	Tableau de distribution pour courant continu et alternatif	Quadro di distribuzione per corrente continua ed alternata	Cuadro de distribución de c.a. y c.c.	Schalttafel fuer Gleich und Wechselstrom
Switch, field-break.	Interrupteur de l'excitation	Interruttore ad eccitazione	Interrupor del campo.	Magnetausschalter
Switch, high-tension	Interrupteur pour haute tension	Interruttore per alta tensione	Interrupor de alta tensión	Hochspannungsschalter
Switch, high-tension remote control	Téléinterrupteur pour haute tension	Interruttore ad alta tensione a distanza	Teleinterrupor de alta tensión	Hochspannungsfernschalter
Switch, over-break	Interrupteur à double coupure	Interruttore ad olio	Interrupor con baño de aceite	Öelschalter
Switch, press (toggle)	Interrupteur à pression	Interruttore a pressione	Interrupor de presión	Druckschalter

Switch, off-break .	Interruttore a pressione .	acete	Druckschalter .
Switch, press (toggle) .	Interruttore a scatto rapido .	Interrupor de tornillo .	Momentschalter .
Switch, quick-break .	Interruttore a scatto brusque .	Interrupor de rotura brusca .	
Switch, single-pole .	Interruttore unipolare .	Interrupor monopolar .	Einpolegeschalter .
Switch, three-phase .	Interruttore tripolare .	Interrupor trifásico .	Drehstromschalter .
Switch, three-way .	Commutatore a tre vie .	Commutador de tres pasos .	3 Wege Umschalter .
Switch, voltmeter .	Interruttore per voltmetro .	Interrupor para voltmetro .	Voltmeterumschalter .
Switch, wave-changing .	Commutatore d'onda .	Commutador de cambio de onda .	Wellen Umschalter .
Syn-tonisation .	Sintonizzazione .	Sintonización .	Abstimmung .
Syn-tonised wireless tele-graphy .	Radiotelegrafia sintonica .	Telegrafia sin hilos sintonizada .	Abstimbare Drahtlose-telegraphie .
Table, operating .	Tavola per il servizio radio-telegrafico .	Mesa de aparatos .	Radiotelegrafischer Bedienungs-tisch (Apparat-tisch) .
Tapper .	Decoherer .	Decohesor de martillo .	Klopfer .
Telegraphy, directional wireless .	Radiotelegrafia a sistema dirigibile .	Telegrafia sin hilos dirigida .	Gerichtete Drahtlose Tele-graphie .
Three-electrode valve .	Vuoto a tre elettrodi .	—	Vakuum röhre mit drei elektroden .
Trailing aerial .	Coda d'aereo .	Antena colgante .	Freihängende Antenne .
Transformer .	Trasformatore .	Transformador .	Transformator .
Transformer, high-frequency oscillation .	Trasformatore delle correnti oscillatorie ad alta frequenza .	Transformador de oscilaciones de alta frecuencia .	Umformer fuer Hochfrequenzschwingungen .
Transformer, oscillatory .	Trasformatore delle correnti oscillatorie .	Transformador oscilatorio .	Oscillationsumformer .
Transmitting arrangement .	Dispositivo di trasmissione .	Dispositivo de transmisión .	Senderanordnung .
Transmitter, cavalry .	Trasmettitore di stazione per cavalleria .	Transmisior para estación de cavaleria .	Kavalleriesendeapparat .
Transmitter, inductive .	Trasmettitore ad accoppiamento induttivo .	Transmisior de acoplamiento de induccion .	Gekoppelte Sender .
Transmitter, sharply tuned .	Trasmettitore acutamente sintonizzato .	Transmisior de sintonización aguda .	Scharf abgestimmte Sender .
Transmitter, simple (P.A.) .	Trasmettitore semplice .	Transmisior sencillo .	Einfacher Sender .
Tremblers .	Interruttore a martello .	Tembladores .	—

ENGLISH.	FRENCH.	ITALIAN.	SPANISH.	GERMAN.
Trembler, cantilever Trench, covered in wiring	Canalisation souterraine.	Fossa coperta per cavi elettrici	Templador de canecillo. Zanja cubierta para cables	Abgedeckter Kabelgraben
Tube, ebonite	Tube en ébonite	Tubo di ebanite	Tubo de ebonita	Ebonitroehre
Tuning	Syntonisation	Sintonizzazione	Sintonización	Abstimmen
Tuning, flat	Syntonisation non aiguë	Sintonizzazione piana	Sintonización aplastada	Unschärfes Abstimmen
Tuner, multiple	Syntonisateur multiple	Sintonizzatore multiplo	Sintonizador múltiple	Vielfache Abstimmaparat
Tuning, note	Hauteur de la note	Sintonizzazione della nota	Sintonización de la nota	Tonhöhe der Abstimmung
Tuning, note and wave	Note et onde de syntoni- sation	Sintonizzazione della nota e dell' onda	Sintonización de la nota y de la onda	Abstimmen von Tonhöhe und Welle
Tuning wave	Onde de syntonisation	Sintonizzazione della onda	Sintonización de la onda	Welle der Abstimmung
Two or three valve ampli- fier	Amplificateur à deux ou trois étages			
Undamped wave. (See Continuous wave.)				
Valve	Valve	Valvola	Válvula	Ventil
Valve, vacuum	Valve à vide	Valvola a vuoto	Válvula de vacío	Vakuumventil
Voltage	Voltage	Potenziale	Voltaje	Spannung
Voltmeter, a.c.	Voltmètre pour courant alternatif	Voltmetro per corrente alternata	Voltmetro c.a.	Voltmeter für Wechsel- strom
Voltmeter, aperiodic	Voltmètre aperiódique	Voltmetro aperiódico	Voltmetro aperiódico	Aperioidisches Voltmeter
Voltmeter, d.c.	Voltmètre pour courant continu	Voltmetro per corrente continua	Voltmetro c.c.	Voltmeter fuer Gleich- strom
Voltmeter, hotwire	Voltmètre à fil chaud	Voltmetro a filo caldo	Voltmetro térmico	Hitzdrahtvoltmeter
Voltmeter, switch	Interrupteur de volt- mètre	Interruttore per volt- metro	Voltmetro, interruptor para	Voltmeterumschalter
Wagon apparatus	Voiture portant les ap- pareils	Carro per gli apparecchi	Aparatos sobre carros	Apparatekarren
Wagon, dynamo	Voiture portant le géné- rateur	Carro per il generatore	Dinamo sobre carros	Kraftkarren-Kraftwagen
Wave frequency	Fréquence des ondes	Frequenza dell'onda	Frecuencia de onda	Wellen frequenz
Wavelength	Longueur d'onde	Longhezza d'onda	Longitud de onda	Wellenlänge
Wavemeter	Ondemètre	Ondametro	Ondámetro	Wellenmesser
Waves, radiation of	Radiation des ondes	Irraggiamento di onde	Radiación de las ondas	Austrahlung der Wellen

GENERAL INFORMATION AND USEFUL TABLES

INTERNATIONAL RULES FOR THE USE OF SYMBOLS REPRESENTING QUANTITIES IN MATHEMATICAL CALCULATIONS

(a) Instantaneous values of electrical quantities which vary with the time to be represented by small letters. In case of ambiguity they may be followed by the subscript "t."

(b) Virtual or constant values of electrical quantities to be represented by capital letters.

(c) Maximum values of periodic electrical and magnetic quantities to be represented by capital letters followed by the subscript "m."

(d) In cases where it is desirable to distinguish between magnetic and electric quantities, constant or variable, magnetic quantities to be represented by capital letters of either script, heavy-faced or any special type. Script letters to be only employed for magnetic quantities.

(e) Angles to be represented by small Greek letters.

(f) Dimensions and special quantities to be represented, wherever possible, by small Greek letters.

THE "MILE" EQUIVALENTS OF VARIOUS NATIONS

	English Yards.
Arabian mile	2,148
Bohemian mile	10,137
Brabant mile	6,082
Burgundy mile	6,183
Chinese li	629
Danish mile	8,244
Dutch mile	6,395
English mile, statute	1,760
English mile, geographical	2,025
Flemish mile	6,869
French posting league	4,263
French marine league	6,075
French legal league of 2,000 toises	4,263
German mile, geographical	8,100
German mile, long	10,126
German mile, short	6,859
Hamburg mile	8,244
Hanoverian mile	11,559
Hesse mile	19,547
Hungarian mile	9,115
Irish mile	2,240
Italian mile	2,025
Poland mile, short	6,071
Poland mile, long	8,100
Portuguese legoa	6,760
Prussian mile	8,237
Roman mile, modern	2,028
Russian verst	1,167
Saxon mile	9,904

WEIGHTS AND MEASURES.

AVOIRDUPOIS WEIGHT.

drachms.	oz.	lb.	qrs.	cwts.	ton.	grammes.					
1 =	·0625	=	·0639	=	·000139	=	·000035	=	·00000174	=	1·771846
16 =	1	=	·0625	=	·00223	=	·000558	=	·000028	=	28·34954
256 =	16	=	1	=	·0357	=	·00893	=	·000447	=	453·59
7168 =	448	=	28	=	1	=	·25	=	·0125	=	12,700
28672 =	1792	=	112	=	4	=	1	=	·05	=	50,802
573440 =	35840	=	2240	=	80	=	20	=	1	=	1,016,048

TROY WEIGHT.

grains.	dwt.	oz.	lb.	grammes.
1 =	·04167	= ·00208	= ·0001736	= ·0648
24 = 1	=	·05	= ·004167	= 1·555
480 = 20	= 1	=	·0833	= 31·1035
5760 = 240	= 12	= 1	=	373·242
7,000 grains troy				1 lb. avoirdupois
175 lb. troy				= 144 lb. avoirdupois
lb. avoirdupois	×	1·2153	=	lb. troy
lb. troy	×	·82286	=	lb. avoirdupois

LONG MEASURE.

in.	feet.	yards.	fath.	poles.	furl.	mile.	metres.
1 =	·083 =	·02778 =	·0139 =	·005 =	·000126 =	·0000158 =	·0254
12 =	1 =	·333 =	·1667 =	·0606 =	·00151 =	·0001894 =	·3048
36 =	3 =	1 =	·5 =	·182 =	·00454 =	·000568 =	·9144
72 =	6 =	2 =	1 =	·364 =	·0091 =	·001136 =	1·8287
198 =	16½ =	5½ =	2½ =	1 =	·025 =	·003125 =	5·0291
7920 =	660 =	220 =	110 =	40 =	1 =	·125 =	201·16
63360 =	5280 =	1760 =	880 =	320 =	8 =	1 =	1609·315

MEASURE OF CAPACITY.

pints.	gall.	peck.	bushel.	quarter.	wey.	last.	cu. ft.	litres.
1 =	·125 =	·0625 =	·01562 =	·00195 =	·00039 =	·000195 =	·02 =	·5676
8 =	1 =	·5 =	·125 =	·0156 =	·00312 =	·00156 =	·1604 =	4·513
16 =	2 =	1 =	·25 =	·03125 =	·00625 =	·00312 =	·3208 =	9·082
64 =	8 =	4 =	1 =	·125 =	·025 =	·0125 =	1·283 =	36·32816
512 =	64 =	32 =	8 =	1 =	·2 =	·1 =	10·264 =	290·625
2560 =	320 =	160 =	40 =	5 =	1 =	·5 =	51·319 =	1453·126
5120 =	640 =	320 =	80 =	10 =	2 =	1 =	102·64 =	2906·25

1 gallon in wine, ale, or dry measure

= 277½ cubic inches = ·16 cubic foot

= 10 lb. of distilled water =

Cube feet × 6·2355 = gallons.

Cube ins. × ·003607 = gallons.

1 bushel = 2218·19 cube inches = 1·28 cube foot.

Cube feet = ·78 = bushels.

Cube ins. × ·00045 = bushels.

SQUARE OR SURFACE MEASURE.

144 square inches = 1 square foot.

9 square feet = 1 square yard.

30¼ square yards = 1 square rod or perch.

40 square rods = 1 rood.

4 roods = 1 acre (4,840 square yards).

640 acres = 1 square mile (3,097,600 square yards).

METRIC SYSTEM OF WEIGHTS AND MEASURES.

The Metric System is based upon the estimated length of the fourth part of a terrestrial meridian. The ten-millionth part of this arc is called a *Metre*, and is the unit of length. The cube of the tenth part of a metre was adopted as

the unit of capacity, and denominated a *Litre*. The weight of a litre of distilled water at its greatest density was called a *Kilogramme*, of which the thousandth part, or *Gramme*, was adopted as the unit of weight. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes *deca*, *hecto*, *kilo*, and *myria*, and the subdivisions by *deci*, *centi*, and *milli*. The units in general use are as follows :—

MEASURES OF LENGTH (UNIT METRE).

Equal to	Metre.	Inches.	Feet.	Yards.	Miles.
Millimetre	0·001	0·039	0·003	0·001	0·000
Centimetre	0·010	0·393	0·032	0·010	0·000
Metre	1·000	39·370	3·280	1·093	0·000
Kilometre	1000·000	39370·790	3280·899	1093·633	0·621

CUBIC, OR MEASURES OF CAPACITY (UNIT LITRE).

Equal to	Cubic inches.	Cubic feet.	Pints.	Gallons.
Cubic Centimetre	0·061	0·000	0·001	0·000
Litre, or cubic decimetre	61·027	0·035	1·760	0·220
Cubic Metre	61027·051	35·316	1760·773	220·096

MEASURES OF WEIGHT (UNIT GRAMME).

Equal to	Grains.	Avoirdupois lb.	Cwt. = 112 lb.	Tons = 20 cwt.
Milligramme	0·015	0·000	0·000	0·0000
Gramme	15·432	0·002	0·000	0·0000
Kilogramme	15432·348	2·204	0·019	0·0009
Tonne = 1,000 kilograms.	—	2204·000	19·678	0·9859

SQUARE OR SURFACE MEASURE.

Equal to	Square feet.	Square yards.
Square Metre	10·7643	1·196

Hectare = 10,000 sq. met. = 11,960 sq. yds. = 2·47 acres.

The Metric System of Weights and Measures, which, as plainly demonstrated in the preceding pages, is logically symmetrical, now forms the usual standard in the following countries :—

*Argentine Republic.	Egypt.	*Peru.
Austria Hungary.	France.	Portugal.
Belgium.	German Empire.	†Roumania.
*Bolivia.	†Greece.	Servia.
*Brazil.	Holland.	*Spain.
*Chile.	Italy.	Sweden.
*Colombia.	*Mexico.	
Denmark.	Norway.	

* Old Spanish measures also occasionally used are :—

Onza	=	1·014 ounce avoirdupois.
Libra	=	1·014 lb. avoirdupois.
Quintal	=	101·44 lb. avoirdupois.
Arroba (of 25 libras)	=	25·36 lb. avoirdupois.
Arroba of Wine	=	6·70 Imperial gallons.
Gallon	=	0·74 Imperial gallon.
Vara	=	0·927 yard.
Square Vara	=	0·859 square yard.

† Turkish measures are also in use :—

Oke of 410 drams	=	2·8283 lb. avoirdupois.
Almud	=	1·151 Imperial gallons.
Kileh	=	0·9120 Imperial gallon.
44 okes = 1 Cantar	=	124·3616 lb. avoirdupois.
39·6263 okes	=	1 cwt.
180 okes = 1 Tcheké	=	509·095 pounds.
1 kileh = 20 okes	=	0·36 Imperial quarter.
816 kilehs	=	100 Imperial quarters.

The following countries have not adopted the Metric System :—

CANADA.—The legal Weight and Measures are the Imperial Yard, Imperial pound avoirdupois, Imperial gallon, and the Imperial bushel. By Act 42 Vict., cap. 16, the British hundredweight of 112 pounds and the ton of 2,240 pounds were abolished, and the hundredweight was declared to be 100 pounds, and the ton 2,000 pounds avoirdupois as in United States, but sometimes contracts stipulate for the British weights.

CHINA.—

Weights— 10 Ch'ien = 1 Liang (Tael) = 1.333 oz. avoirdupois or 37.78 grammes
 16 Liang = 1 Kin (Catty) = 1.333 lb. avoirdupois or 604.53 grammes
 100 Chin = 1 Tan (Picul) = 133.333 lb. avoirdupois or 60.453 kilogrammes
 4 ozs. = 3 taels; 1 lb. = $\frac{3}{4}$ catty or 12 taels; 1 cwt. = 84 catties; 1 ton = 16 piculs 80 catties

Capacity—10 Ko = 1 Sheng (pint) = 1.031 litre
 10 Sheng = 1 Tou (peck) = 10.31 litre (holding from 6½ to 10 Kin of rice and measuring from 1.13 to 1.63 gallon)

Commodities, even liquids, such as oil, spirits, etc., are commonly bought and sold by weight.

Length—10 Fen = 1 Ts'un (inch)
 10 Ts'un = 1 Chi'h (foot) = 14.1 English inches by treaty
 10 Chi'h.. .. = 1 Chang = 11 ft. 9 in. (141 in. by treaty)
 1 Li = $\frac{1}{2}$ English mile (about)

The mow, the unit of measurement, is almost exactly one-sixth of an acre.

In the tariff settled by treaty between Great Britain and China, the Chi'h of 14 $\frac{1}{10}$ English inches has been adopted as the legal standard. The standards of weight and length vary all over the Empire, the Chi'h ranging from 9 to 16 English inches, and the Chang (= 10 Chi'h) in proportion; at the treaty ports, the use of foreign treaty standard of Chi'h and Chang is common.

In October, 1907, a decree for uniform weights and measures was issued, making the K'up'ing or Treasury Scale the standard weight. The K'up'ing tael or ounce weighs 575.64 grains. The Haikwan tael weighs 581.47 grains.

INDIA.—The Maund of Bengal.

40 Seers = 82½ lb. avoirdupois
 The Maund of Madras .. = 25 lb. avoirdupois (nearly)
 The Tola = 180 grains troy
 The Guz of Bengal .. = 36 inches

An Act to provide for the adoption of an uniform system of weights and measures was passed in 1871. The Act orders: "Art. 2. The primary standard of weight shall be called a seer, and shall be a weight of metal in the possession of the Government of India, equal, when weighed in a vacuum, to the weight known in France as the kilogramme = 2.205 lb. avoirdupois." "Art. 3. The units of weight and measures of capacity shall be, for weights, the said

seer; for measures of capacity, a measure containing one such seer of water at its maximum density, weighed in a vacuum. Unless it be otherwise ordered, the subdivisions of all such weights and measures of capacity shall be expressed in decimal parts." This Act, however, has never been in operation.

JAPAN.—

The Mommé	= 2.11 drams or 2.41 dwts. or 120 mommé=1 lb. avoirdupois
The Kin (Catty)=160 mommé	= 1.322 lb. avoirdupois (0.266 mommé=1 gramme) or 1.60 lb. troy
The Picul (100 kin)	= 132.27 lb.
The Kwan=1,000 mommé ..	= 8.261 lb. avoirdupois or 10.04 lb. troy
The Shaku	= .994 foot (3.3 shaku=1 metre)
The Kujira Shaku	= 1.242 feet
The Sün	= 1.193 inches
The Ken=6 Shaku	= 5.965 feet
The Jo=10 Shaku	= 9.942 feet
The Chô=60 Ken	= 357.916 feet, or about $\frac{1}{15}$ mile
The Ri=36 Chô	= 2.44 miles
The Ri (marine)	= 1.15 mile
The Ri (square)	= 5.9552 square miles
The Chô=10 tan	= 2.45 acres
The Koku, Liquid=10 To=100 Sho	= 39.7033 gallons
The Koku, Dry	= 4.9629 bushels
The Koku (capacity of vessel)	= $\frac{1}{10}$ ton
The To, Liquid	= 3.9703 gallons
The To, Dry	= 1.9851 peck

RUSSIA.—

1 Verst (500 sajènes)	= 3,500 feet, or two-thirds of a statute mile
1 Sajène (3 arshins)	= 7 feet
1 Arshin (16 vershok)	= 28 inches
1 Square Verst	= 0.43941 square mile
1 Dessiatine	= 2.69972 acres
1 Pound (96 zolotniks=32 lot)	= $\frac{9}{16}$ of a pound or 14.4 ounces
1 Pood (40 pounds)	= 36.113 lb.=0.32244 cwt. or 100 poods = 1.6121 tons. Baltic Freight is usually quoted per ton of 62 poods
1 Vedro (8 shtoffs)	= 2 $\frac{1}{4}$ Imperial gallons
1 Chetvert (8 chetveriks) ..	= 5.77 Imperial bushels or 46.2 gals.

UNITED STATES.—

British weights and measures are usually employed, but the old Winchester gallon and bushel are used instead of the new or Imperial standards. Different States have a legal standard for bushels of certain articles, such as grain and potatoes, varying from 60 lb. for wheat to 32 for oats.

Wine gallon	= 0.83333 gallon
Ale gallon	= 1.01695 gallon
Bushel	= 0.9692 Imperial bushel

Instead of the British cwt. a cental of 100 lb. is used. 1 ton=2,000 lb., except coal, which is usually 2,240 lb. wholesale.

TT

NAUTICAL MEASURES

(From "Lloyd's Calendar," by permission of the Committee of Lloyd's.)

12 inches .. ..	..=1 foot	6 feet .. ..	..=1 fathom
3 feet .. ..	..=1 yard	3 nautical miles	..=1 league

Sea or Nautical Mile=one-sixtieth of a degree of latitude, and varies from 6,046 ft. on the Equator to 6,092 ft. in lat. 60°

Nautical Mile for speed trials, generally called the Admiralty Measured Mile $\left\{ \begin{array}{l} 6,080 \text{ feet} \\ 1.151 \text{ statute miles} \\ 1,853 \text{ metres} \end{array} \right.$

Cable's length=the tenth of a nautical mile; or, approximately, 100 fathoms or 200 yards.

A Knot=a nautical mile an hour, is a measure of speed, but is not infrequently, though erroneously, used as synonymous with a nautical mile.

Length of European Measures of Distances compared with the Nautical Mile of 6,080 ft.

	Length in Nautical Miles.		Length in Nautical Miles.
Nautical Mile	1.000	German Ruthen	4.064
British Statute Land Mile	0.868	Italian Mile	1.000
Austrian Mile	4.094	Norwegian Mile	6.097
Danish Mile.. ..	4.064	Russian Verst	0.576
French Kilometre	0.539	Swedish Mile	5.769
German Geographical Mile	4.000		

DISTANCE OF HORIZON AT SEA.

Let h be the height of the observer's eye above sea level, D the distance to the horizon, and R the earth's radius.

Then

$$D^2 = 2Rh$$

And thus D in statute miles = $1.22 \sqrt{h}$ in feet

D in kilometres = $2.52 \sqrt{h}$ in metres

An object of height h^1 is seen by an eye at height h at a distance D^1 given by

D^1 in statute miles = $1.22 \sqrt{h}$ in feet + $\sqrt{h^1}$ in feet

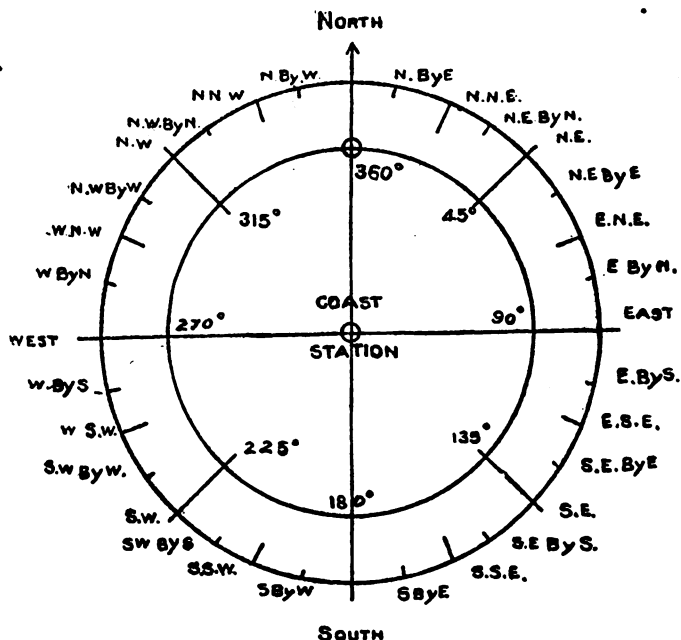
D^1 in kilometres = $2.52 \sqrt{h}$ in metres + $\sqrt{h^1}$ in metres

The distance of the horizon—i.e., the greatest distance at which the surface of the sea is visible—varies somewhat with refraction in the atmosphere, but is, on clear days, approximately as below:—

Elevation Feet.	Miles.	Elevation Feet.	Miles.	Elevation Feet.	Miles.
5.....	2.96	50.....	9.35	500.....	29.58
10.....	4.18	100.....	13.23	1000.....	33.40
20.....	5.92	200.....	18.72	5280.....	96.18
		300.....	22.91		

METHOD OF DENOTING THE TRUE BEARING AND COURSE OF A SHIP AT SEA

As regards the true bearing of the ship from the coast station, the degrees are reckoned "clockwise" from north round through east, south and west.



Thus, if the ship's bearing from the coast station is anything between north and east, the number to be signalled will be between 0 and 90.

Between east and south the number will be between 90 and 180.

Between south and west the number will be between 180 and 270.

Between west and north the number will be between 270 and 360.

Similarly, if the ship's course is between N. and E. the number to be signalled will be between 0 and 90.

Between E. and S. the number to be signalled will be between 90 and 180.

Between S. and W. the number to be signalled will be between 180 and 270.

Between W. and N. the number to be signalled will be between 270 and 360.

To facilitate the conversion of the bearing and course into the number of degrees to be signalled, a table is appended in which either the bearing of the ship from the coast station, or the bearing of the coast station from the ship can be ascertained and the number of degrees to be signalled seen at a glance. The course must be looked for in the same column as the bearing of the ship from the coast station.

Thus a ship 150 miles bearing S 75° W. from a coast station and steaming S. 85° E. at 15 knots, and having telegrams comprising 75 words to send, on receiving the signal to Go (— • —) from the coast station, would signal the following (Rule 22 of Part II):—

— • — • — XYZ — • • • ABC 150 255
 95 15 75 • — • — •
 (end).

TABLE TO CONVERT BEARING AND COURSE INTO DEGREES.

Course of Bearing of Ship from Coast Station.	Bearing of Coast Station from Ship.	Degrees to be signalled.
North	South	0°
N. 10° E.	S. 10° W.	10°
20°	20°	20°
30°	30°	30°
40°	40°	40°
50°	50°	50°
60°	60°	60°
70°	70°	70°
80°	80°	80°
East	West	90°
S. 80° E.	N. 80° W.	100°
70°	70°	110°
60°	60°	120°
50°	50°	130°
40°	40°	140°
30°	30°	150°
20°	20°	160°
10°	10°	170°
South	North	180°
S. 10° W.	N. 10° E.	190°
20°	20°	200°
30°	30°	210°
40°	40°	220°
50°	50°	230°
60°	60°	240°
70°	70°	250°
80°	80°	260°
West	East	270°
N. 80° W.	S. 80° E.	280°
70°	70°	290°
60°	60°	300°
50°	50°	310°
40°	40°	320°
30°	30°	330°
20°	20°	340°
10°	10°	350°
North	South	360° or 0

AREAS AND CIRCUMFERENCES OF CIRCLES ADVANCING BY ONE-TENTHS—I.

Diam.	Areas	Circ.	Areas	Circ.	Areas	Circ.	Areas	Circ.	Areas	Circ.
0	.0	.0	.1	.1	.2	.2	.3	.3	.4	.4
1	.78	3.14	.95	3.45	.13	3.77	1.32	4.08	1.53	4.39
2	3.14	6.28	3.46	6.59	3.80	6.91	4.15	7.22	4.52	7.53
3	7.06	9.42	7.54	9.74	8.04	10.05	8.55	10.36	9.07	10.68
4	12.56	12.56	13.20	12.88	13.85	13.19	14.52	13.50	15.20	13.82
5	19.63	15.70	20.42	16.02	21.23	16.33	22.06	16.65	22.90	16.96
6	28.27	18.84	29.22	19.16	30.19	19.47	31.17	19.79	32.16	20.10
7	38.48	21.99	39.59	22.30	40.71	22.61	41.85	22.93	43.00	23.24
8	50.26	25.13	51.53	25.44	52.81	25.76	54.10	26.07	55.41	26.38
9	63.61	28.27	65.03	28.58	66.47	28.90	67.92	29.2	69.30	29.53
10	78.53	31.41	80.11	31.73	81.71	32.04	83.32	32.35	84.94	32.67

AREAS AND CIRCUMFERENCES OF CIRCLES ADVANCING BY ONE-TENTHS—II.

Diam.	Areas	Circ.	Areas	Circ.	Areas	Circ.	Areas	Circ.	Areas	Circ.
0	.5	.5	.6	.6	.7	.7	.8	.8	.9	.9
1	1.76	1.57	2.8	1.88	3.8	2.19	5.0	2.51	6.3	2.82
2	4.71	4.71	5.02	5.02	5.34	5.34	5.65	5.65	5.96	5.96
3	9.62	7.85	5.30	8.16	5.72	8.48	6.15	8.79	6.60	9.11
4	15.90	10.99	10.17	11.30	10.75	11.62	11.34	11.93	11.94	12.25
5	23.75	14.13	16.61	14.45	17.34	14.76	18.09	15.08	18.85	15.39
6	33.18	17.37	24.63	17.59	25.31	17.90	26.42	18.22	27.33	18.53
7	44.17	20.42	34.21	20.73	35.25	21.04	36.31	21.36	37.39	21.67
8	56.74	23.56	45.36	23.87	46.56	24.19	47.78	24.50	49.01	24.81
9	70.88	26.70	58.08	27.01	59.44	27.33	60.82	27.64	62.21	27.96
10	86.59	29.84	72.38	30.15	73.89	30.47	75.42	30.78	76.97	31.10
		32.98	88.24	33.30	89.92	33.61	91.60	33.92	93.31	34.24

LENGTH OF A DEGREE IN LATITUDE AND LONGITUDE.

Lat. °	Degree of Longitude.		Degree of Latitude.		Lat. °	Degree of Longitude.		Degree of Latitude.	
	Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut. Miles.		Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut. Miles.
0	69.160	60.000	68.698	59.600	45	48.986	42.498	69.044	59.899
2	.119	59.964	.609	.601	47	47.251	40.993	.068	.920
4	68.992	.855	.702	.603	49	45.459	39.439	.092	.941
6	.783	.673	.706	.607	51	43.611	37.835	.116	.962
8	.491	.419	.712	.612	53	41.710	36.186	.140	.982
10	.116	.093	.719	.618	55	39.758	34.491	.162	60.002
12	67.659	58.697	.728	.625	57	37.756	32.755	.184	.022
14	.120	.229	.738	.634	59	35.707	30.979	.206	.041
16	66.499	57.690	.750	.645	61	33.615	29.164	.228	.059
18	65.797	.081	.764	.657	63	31.481	27.311	.248	.077
20	.015	56.404	.779	.669	65	29.308	25.425	.268	.094
22	64.154	55.657	.795	.683	67	27.100	23.509	.286	.110
24	63.216	54.843	.813	.699	69	24.857	21.564	.302	.124
26	62.201	53.962	.831	.715	71	22.582	19.593	.318	.137
28	61.110	.016	.850	.731	73	20.282	17.597	.333	.149
30	59.944	52.005	.870	.749	75	17.956	15.578	.345	.161
32	58.706	50.931	.892	.767	77	15.607	13.539	.357	.171
34	57.396	49.794	.914	.786	79	13.238	11.484	.367	.179
36	56.016	48.597	.936	.806	81	10.853	9.417	.375	.186
38	54.568	47.340	.959	.826	83	8.456	7.338	.381	.192
40	53.053	46.026	.983	.846	85	6.048	5.248	.387	.196
42	51.473	44.656	69.007	.866	87	3.632	3.151	.390	.199
44	49.830	43.231	.013	.888	89	1.211	1.050	.392	.201

MEASURES OF TIME

The earth's axial rotation is the phenomenon by which time is measured everywhere on the earth's surface. Experiment and observation show that if we assume the earth to rotate uniformly, there are many other phenomena which are as accurately isochronous in their periodicity. That is to say, they pass again and again through all their phases in exactly the same interval of time as measured in terms of the earth's rotation. In the pendulum of a clock and the balance wheel of a watch we have such isochronism very approximately realised. A little consideration will convince us that the measurement of time is really a comparison of periodic sequences. We cannot conceive any other mode of marking off time intervals than by some kind of motion of a periodic character. Our practical unit of time is essentially terrestrial.

SIDEREAL DAY.—The standard unit of time is the **SIDEREAL DAY**, being the period in which the earth turns once round on its axis. It is divided into sidereal hours, minutes, and seconds; but these measures of time are used by astronomers only.

MEAN SOLAR TIME.—A **SECOND** is the time of one swing of a pendulum adjusted so as to make 86,164.09 swings in a sidereal day. Seconds are usually subdivided decimally.

One **MEAN SOLAR DAY** = 24 hours = 1,440 minutes = 86,400 seconds = 1.00273791 sidereal day.

RELATION BETWEEN TIME AND LONGITUDE.—At any given instant the mean solar time at two stations differ by an amount proportional to their difference of longitude, the time at the eastern station being the earlier.

CORRESPONDING DIFFERENCES.

Longitude.	Time.	Longitude.	Time.
15"	1 second.	75°	5 hours.
1'	4 seconds.	90	6 "
15'	1 minute.	105	7 "
1°	4 minutes.	120	8 "
15°	1 hour.	135	9 "
30	2 hours.	150	10 "
45	3 "	165	11 "
60	4 "	180	12 "

To show the exact date of any event, the meridian at which the time is reckoned must be specified. One degree longitude at Equator = 60 nauts = 69.17 statute miles.

STANDARD OR ZONE TIME.

Country.	Central Meridian.	Fast or Slow on Greenwich Time.*
Western Europe, Algeria	0°	Greenwich Time
Central Europe, Tunis, Congo, Angola, German South-West Africa	15° E.	1 h. fast
Eastern Europe, British South Africa, Egypt, Portuguese East Africa	30° E.	2 h. fast
Mauritius, Reunion and Seychelles	60° E.	4 h. fast
India (except Calcutta) and Ceylon	82½° E.	5½ h. fast
Calcutta	90° E.	6 h. fast
Burmah	97½° E.	6½ h. fast
Federated Malay States, Straits Settlements, and French Indo-China	105° E.	7 h. fast
Java	109° 48' 37.5" E.	7 h. 19 m. 14.5 s. fast
Western Australia, Hong-Kong, East Coast of China, Kiau Chau, Philippine Islands, British North Borneo, Labuan	120° E.	8 h. fast
Korea	127° 30' E.	8½ h. fast
Japan, Seoul, and Chemulpo	135° E.	9 h. fast
South Australia and Guam	142° 30' E.	9½ h. fast
New South Wales, Queensland, Tasmania, Victoria, New Guinea, and Caroline Island	150° E.	10 h. fast
New Zealand	172½° E.	11½ h. fast
Ascension	14° 15' W.	57 m. slow
Iceland, Madeira, Liberia and Portuguese Guinea	15° W.	1 h. slow
America :		
Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, Grenada, Trinidad, etc.)	60° W.	4 h. slow
Eastern (Eastern U.S., Chili, Panama, Peru, etc.)	75° W.	5 h. slow
Central	90° W.	6 h. slow
Mountain	105° W.	7 h. slow
Pacific (British Columbia, etc.)	120° W.	8 h. slow
Alaska	135° W.	9 h. slow
Hawaii or Sandwich Islands	157° 30' W.	10½ h. slow
Samoa	172½° W.	11½ h. slow

* Greenwich time is used in France, Spain, Portugal, Belgium, Gibraltar, and the Faroes.

BELL TIME ON BOARD SHIP.

The nautical day begins at noon and is divided into "watches" of four hours each, time being indicated by bells striking every half-hour.

A.M.	A.M.	A.M.	P.M.	P.M.
12.30	4.30	8.30....1	BELL ....12.30	4.30 8.30
1.00	5.00	9.00....2	BELLS.... 1.00	5.00 9.00
1.30	5.30	9.30....3	BELLS.... 1.30	5.30 9.30
2.00	6.00	10.00....4	BELLS.... 2.00	6.00 10.00
2.30	6.30	10.30....5	BELLS.... 2.30	6.30 10.30
3.00	7.00	11.00....6	BELLS.... 3.00	7.00 11.00
3.30	7.30	11.30....7	BELLS.... 3.30	7.30 11.30
4.00	8.00	NOON... 8	BELLS.... 4.00	8.00 MIDNIGHT.

One of these four-hour watches is divided into two "dog watches" :—

- (1) From 4 to 6 p.m.
- (2) From 6 to 8 p.m.

The hours for the "dog watches" are :—

4 BELLS.....	6.00 p.m.
1 BELL	6.30 p.m.
2 BELLS.....	7.00 p.m.
3 BELLS.....	7.30 p.m.

CONCISE TABLES OF CONTINENTAL MONEYS.

(Extracted by permission from Bradshaw's Continental Guide.)

(1) A CONCISE TABLE OF FOREIGN MONEYS, REDUCED FROM ENGLISH INTO THE CURRENCY OF OTHER COUNTRIES AT PAR.

England.	France, Italy, Belgium, Switzer- land.	Germany.	Holland.	United States.	Austria in Notes.	Russia in Notes.
£ s. d.	Frs. Cts.	Mks. Pf.	Fl. Cts.	Dols. Cts.	Kronen.	Roubles.
0 0 0½	0 052	0 04	0 02	0 01	·04	·01
0 0 1	0 104	0 08	0 05	0 02	·08	·03
0 0 2	0 208	0 17	0 10	0 04	·18	·07
0 0 3	0 312	0 25	0 15	0 06	·26	·10
0 0 4	0 416	0 33	0 20	0 08	·38	·14
0 0 5	0 520	0 42	0 25	0 10	·48	·18
0 0 6	0 625	0 50	0 30	0 12	·56	·21
0 0 7	0 729	0 58	0 35	0 14	·66	·25
0 0 8	0 833	0 67	0 40	0 16	·76	·28
0 0 9	0 937	0 75	0 45	0 18	·86	·32
0 0 10	1 040	0 84	0 50	0 20	·96	·36
0 0 11	1 144	0 92	0 55	0 23	1·04	·39
0 1 0	1 25	1 0	0 60	0 25	1·20	·47
0 2 0	2 50	2 0	1 20	0 50	2·40	·95
0 3 0	3 75	3 0	1 80	0 75	3·60	1·42
0 4 0	5 0	4 0	2 40	1 0	4·80	1·90
0 5 0	6 25	5 0	3 0	1 25	6·	2·37
0 6 0	7 50	6 0	3 60	1 50	7·20	2·85
0 7 0	8 75	7 0	4 20	1 75	8·40	3·32
0 8 0	10 0	8 0	4 80	2 0	9·60	3·80
0 9 0	11 25	9 0	5 40	2 25	10·80	4·27
0 10 0	12 50	10 0	6 0	2 50	12·	4·75
0 11 0	13 75	11 0	6 60	2 75	13·20	5·22
0 12 0	15 0	12 0	7 20	3 0	14·40	5·70
0 13 0	16 25	13 0	7 80	3 25	15·60	6·17
0 14 0	17 50	14 0	8 40	3 50	16·80	6·65
0 15 0	18 75	15 0	9 0	3 75	18·	7·12
0 16 0	20 0	16 0	9 60	4 0	19·20	7·60
0 17 0	21 25	17 0	10 20	4 25	20·40	8·07
0 18 0	22 50	18 0	10 80	4 50	21·60	8·55
0 19 0	23 75	29 0	11 40	4 75	22·80	9·02
1 0 0	25 0	20 0	12 0	5 0	24·	9·40
2 0 0	50 0	40 0	24 0	10 0	48·	18·80
3 0 0	75 0	60 0	36 0	15 0	72·	28·20
4 0 0	100 0	80 0	48 0	20 0	96·	37·60
5 0 0	125 0	100 0	60 0	25 0	120·	47·
6 0 0	150 0	120 0	72 0	30 0	144·	56·40
7 0 0	175 0	140 0	84 0	35 0	168·	65·80
8 0 0	200 0	160 0	96 0	40 0	192·	75·20
9 0 0	225 0	180 0	108 0	45 0	216·	84·60
10 0 0	250 0	200 0	120 0	50 0	240·	94·

FOREIGN AND COLONIAL MONEYS WITH APPROXIMATE VALUE IN BRITISH CURRENCY AT NORMAL RATES OF EXCHANGE

ARGENTINE REPUBLIC.—Gold coin, 5 dollars. Silver coins, 1 dollar and 50, 20, and 10 centavos. Bronze coins, 2 and 1 centavos. Nickel coins, 20, 10 and 5 centavos. Silver dollar or peso=4s. Money in circulation is chiefly paper, being converted at 44 cents gold to dollar=1s. 9d. Gold dollar=4s.

AUSTRALIA.—The same as in Great Britain.

AUSTRIA-HUNGARY.—Gold coins, 100 krone=£4 3s. 4d.; 20 krone=16s. 8d.; 10 krone=8s. 4d.; Single ducat=11 crowns 29 heller=9s. 4½d. Silver coin, 1 krone=100 heller=half gulden old coinage=10d. Exchange

about 24 krone to £. Silver gulden or florins (about 12=£)=100 kreutzer continue to be legal tender. Nickel, 20 heller=10 kreutzer of old coinage=2d., 10 heller=5 kreutzer of old coinage=1d. Bronze, 2 heller=1 kreutzer= $\frac{1}{2}$ d., 1 heller= $\frac{1}{4}$ kreutzer= $\frac{1}{10}$ d.

BELGIUM.—The same as France.

BOLIVIA.—100 centavos=1 boliviano (paper)=about 1s. 7d., or 12 $\frac{1}{2}$ bolivianos to £. Coins in circulation are—silver, 50, 30, 20 and 10 centavos; nickel, 10 and 5 centavos, and English gold coin. Currency principally paper.

BRAZIL.—Currency paper, worth 1s. 4 $\frac{1}{2}$ d. per milreis (1,000 reis) or nearly 15 milrei=£1. Silver coinage of 2, 1 and $\frac{1}{2}$ milreis pieces in circulation.

BRITISH HONDURAS.—100 centavos=1 dollar (gold)=4s. 1 $\frac{1}{2}$ d. British sovereign (= \$4.86) and half sovereign, and U.S. gold coins legal. Silver coins—5, 10, 25 and 50 cents legal tender to \$10. Bronze—1 cent. legal tender to 50 cents.

BULGARIA.—Lev (=franc) = 100 stotinki=9 $\frac{1}{2}$ d. (stotinka=centime). Gold coins, 10 and 20 leva, but foreign 10 and 20 franc pieces principally in circulation. Silver, $\frac{1}{2}$, 1, 2 and 5 leva. Nickel, 2 $\frac{1}{2}$, 5, 10, 20 stotinki. Bronze, 1, 2, 5, 10 stotinki.

CANADA.—1 cent= $\frac{1}{2}$ d. 100 cents=1 dollar=about 4s. 1 $\frac{1}{2}$ d. 4 dollars 86 $\frac{2}{3}$ cents=£ sterling. U.S. gold coins also legal.

CHILI.—Gold coins, 20 (colon or condor), 10 (doubloon), and 5 (escudo) peso pieces. Silver coins, 1 peso and $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ of a peso. Bronze coins, $\frac{1}{2}$, 1, 2 and 2 $\frac{1}{2}$ centavo pieces. Currency is paper—the peso or dollar=about 10d. The restoration of the gold currency is projected under a currency law which was to take effect in 1910, but has been since deferred. Gold peso=1s. 6d. English sovereign has a legal value of 13 $\frac{1}{4}$ pesos gold.

CHINA.—1,220 (about) cash=1 haikwan (or customs) tael=about 2s. 8 $\frac{1}{2}$ d. About 35 cash=1d. A coin recently issued is the "hundredth of a dollar" worth about $\frac{3}{8}$ of 1d. Silver dollar of same value as Japanese silver yen, is also current. At Hong-Kong the dollar (1,000 cash)=about 1s. 11d. and at Shanghai about 2s. 8d. In October, 1908, an Imperial Edict decreed the establishment of a uniform Tael currency—unit silver tael to have a value of between 30d. and 40d.

COCHIN CHINA.—5 sapèques or cash=1 cent; 100 cents=1 dollar=about 2s.

COLOMBIA.—100 centavos=1 peso or dollar gold—nominal value 4s. Gold coins, 1, 2 $\frac{1}{2}$ and 5 dollars. Silver coins, real peseta, half-dollar and dollar. Very few coins are in circulation, the currency being principally paper, subject to considerable fluctuation. At the legal rate the paper peso=1 centavo gold, or \$500=£1.

DENMARK.—100 Oere=1 Krone=1s. 1 $\frac{1}{2}$ d. 18 Kroner 19 Oere=£ sterling. Gold coins of 20 Kroner and 10 Kroner. Silver, 2 Kroner, 1 Krone, 25 Oere, and 10 Oere.

EGYPT.—97 $\frac{1}{2}$ piastres=£ sterling. 100 piastres, or 1,000 milliemes=£ Egyptian (gold)=£1 os. 6 $\frac{1}{2}$ d. Gold circulating is almost exclusively English. 10 milliemes=1 piastre=about 2 $\frac{1}{2}$ d. Gold piece of 20 francs=about 77 piastres. Silver coins, 1, 2, 5, 10 and 20 piastres; legal tender to £2.

ERITREA.—1 tallero=5 Italian lire. Silver coins, 1, 2, 5 talleros.

FRANCE.—100 centimes=1 franc= $9\frac{1}{4}$ d. 20 franc piece (Louis or Napoleon)=15s. 10d. About 25 francs 25 centimes= $\frac{1}{2}$ sterling. Gold coins of 5, 10, 20, 50 and 100 francs. Silver coins 20 centimes, $\frac{1}{2}$, 1, 2 and 5 franc pieces. Nickel coin, 25 centimes. Bronze coins, 1, 2, 5 and 10 centimes.

GERMANY.—100 pfennig=1 mark=about 1s. About 20.45 m.= $\frac{1}{2}$ sterling. Gold coins, 20 (doppel-krone), 10 (krone), and 5 (half-krone) marks. Silver coins, 1, 2, 3 and 5 marks and 50 pfennige. Thaler=3 marks=2s. 11d. Nickel coins, 20, 10 and 5 pfennige. Bronze coins, 1 and 2 pfennige.

GREECE.—100 lepta=1 drachma paper=9d. 27 drachmæ 30 lepta= $\frac{1}{2}$ l or about 108 drachmæ per 100 fcs. Foreign gold coins in circulation.

HOLLAND.—100 cents=1 guilder or florin=1s. 8d. 12 guilders 10 cents= $\frac{1}{2}$ sterling. Gold coins, 10 florins (16s.). Silver coins, 2 $\frac{1}{2}$ guilders (rijksdaaler), 1 guilder, $\frac{1}{2}$ guilder and 25 cents.

INDIA.— $\frac{1}{2}$ l = 15 rupees. 16 annas=1 rupee=1s. 4d. 3 pie=1 pice, 12 pie=1 anna=1d. Lac of rupees=100,000. Crore of rupees=10,000,000.

ITALIAN SOMALILAND.—Rupia, value L. It. 1.68 (= $\frac{1}{15}$ ster.). Silver coins, 1 rupia, $\frac{1}{2}$ rupia, $\frac{1}{4}$ rupia. Bronze coins, 1 besa (value L. It. 0.0168) 2 besas, 4 besas. 1 rupia is equal to 100 besas.

ITALY.—100 centesimi=1 lira= $9\frac{1}{4}$ d. About 25 lire 40 centesimi= $\frac{1}{2}$ l sterling. Gold coins, 100, 50, 20 and 10 lire. Silver coins, 5, 2, and 1 lira. Nickel coin, 20 centesimi. Bronze coins, 1, 2, 5 and 10 centesimi.

JAPAN.—10 rin=1 sen= $\frac{1}{4}$ d., 100 sen=1 yen or dollar=2s. 0 $\frac{1}{2}$ d. Gold coins 5, 10, and 20 yen. Silver coins, 10, 20 and 50 sen. Nickel coin, 5 sen. Bronze coins, 1 sen and 5 rin. The unit of account is the gold yen.

LIBYA.—The same currency as in Italy.

MEXICO.—100 centavos=1 dollar or peso (silver)=2s. 0 $\frac{1}{2}$ d.

NORWAY.—100 ore=1 krone=1s. 1 $\frac{1}{4}$ d. Gold coins, 10 and 20 kroner. Exchange 18.19 kroner= $\frac{1}{2}$ sterling. Paper money principally used; least value, 5 kroner. Below this amount, silver and copper coins.

PORTUGAL.—100 reis=1 teston=4d. 1,000 reis=1 milreis. Paper milreis=about 4s. 1d. Gold coins, 1, 2, 5 and 10 milreis. Currency, principally paper. Conto=1,000 milreis. In the Azores, 1 milrei=3s. 6 $\frac{1}{2}$ d.

ROUMANIA.—1 leu=100 bani=about 9 $\frac{1}{4}$ d. Gold coins, 5, 10 and 20 lei. Silver, 1 leu, 2 and 5 lei. Nickel, 5, 10 and 20 bani.

RUSSIA.—100 copecks=1 rouble. Silver or paper rouble=2s. 1 $\frac{1}{4}$ d. Gold coins—15 roubles (imperial), 10 roubles, 7.50 roubles (half-imperial), 5 roubles. 15 paper roubles=10 roubles gold=roughly 1 guinea. Currency principally paper.

SERVIA.—Dinar=1 franc= $9\frac{1}{4}$ d. Gold coins, 10 and 20 dinars. Silver, $\frac{1}{2}$, 1, 2, 5 dinars. Bronze, 5 and 10 paras. Nickel, 5, 10, 20 paras.

SPAIN.—100 centimos=1 peseta—about 26.70 pesetas to the $\frac{1}{2}$ sterling. Gold coins are 20, 10 and 5 peseta pieces. Silver coins, 1 and 5 pesetas.

STRAITS SETTLEMENT AND MALAY STATES.—Gold dollar=2s. 4d. Silver coins—50, 20 10 and 5 cent pieces—are legal tender to 2 dollars, but $\frac{1}{2}$ dollar is unlimited tender. Copper coins—1, $\frac{1}{2}$ and $\frac{1}{4}$ cents—are legal tender to 1 dollar.

SWEDEN.—Krona of 100 ore = 1s. 1½d. or 18·19 kr. to the £1. Gold little used. Currency for 5 kr. or more mostly paper.

TURKEY.—40 paras = 1 piastre = 2½d. nearly. 100 piastres = 1 lira turca or gold medjidie = 18s. 109½ pias = £1. "Purse," sometimes used in accounts = 500 piastres or 5 liras and is calculated = £4 10s. od. Value of piastre varies in different parts of the Turkish Dominions. In Syria 1 Turkish £ = 130 local piastres and £1 = 143½ local piastres.

UNITED STATES.—1 cent = about ½d., 100 cents = 1 dollar = 4s. 1½d. 4 dols. 87 cents = £ sterling. Gold coins, 2½ dollar piece, half eagle (5 dollars), 1 eagle (10 dollars), 1 double eagle (20 dollars).

URUGUAY.—100 centavos = 1 dollar (gold) = about 4s. 3d., or \$4·70 = £. Only foreign gold coins (which are legal tender) are in circulation. Silver coins, 10, 20 and 50 cents and 1 dollar. Nickel, 1, 2 and 5 cents.

VENEZUELA.—Medio = about 2½d.; real = about 5d. Monetary unit is silver bolivar = about 9½d., or 1 franc, or 25·25 bols. to the £. Exchange fluctuates slightly from the par, but 25·25 bols to the £ should be taken as a basis. Currency is based on gold standard—no paper in circulation. Coins are gold, silver and nickel, but principal coin is silver dollar of 5 bols. known as "peso fuerte" or simply "fuerte."

ATOMIC AND ELECTRONIC DATA

The radius of a hydrogen molecule is $1·2 \times 10^{-8}$ cms.

The mass of a hydrogen molecule is $3·3 \times 10^{-24}$ gms.

The average velocity of a molecule in air at 15° C. is 459 metres per second.

The mean free path of a molecule in air at atmospheric pressure is $1·42 \times 10^{-3}$ cms.; in a soft valve of typical pressure ·5 mm. the mean free path is $2·16 \times 10^{-3}$ cms.; while in a hard valve of pressure 10^{-6} mm. the mean free path is 12,500 cms.

The number of molecules per cc. at atmospheric pressure is $2·75 \times 10^{19}$; thus their average distance apart is 3×10^{-6} cms.

The number of molecules per cc. in a soft valve of pressure ·5 mm. is $1·8 \times 10^{16}$; thus their average distance apart is $3·8 \times 10^{-6}$ cms.

The number of molecules per cc. in a hard valve of pressure 10^{-6} mm. is $3·6 \times 10^{10}$; thus their average distance apart is 3×10^{-6} cms.

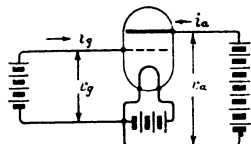
The negative charge on an electron is 4·774 electrostatic units or $15·91 \times 10^{-20}$ coulombs.

The diameter of an electron is 4×10^{-13} cms.

The mass of an electron is 9×10^{-28} gms.

The velocity of an electron after falling through a potential drop of V volts is $6 \times 10^7 \sqrt{V}$ cms. per second; thus after falling through a potential of 100 volts the electronic velocity is $6 \times 10^7 \times \sqrt{100} = 6 \times 10^8$ cms. per second.

VALVE NOMENCLATURE AND SYMBOLS



Let i_g , i_a , v_g and v_a represent grid and anode currents and potentials. (See Figure.)

Then $a_g = \frac{\delta i_a}{\delta v_g} =$ mutual conductance

$a_a = \frac{\delta i_a}{\delta v_a} =$ anode conductance

$g_k = \frac{\delta i_k}{\delta v_g} =$ grid conductance

$g_a = \frac{\delta i_g}{\delta v_a} =$ conjugate mutual conductance

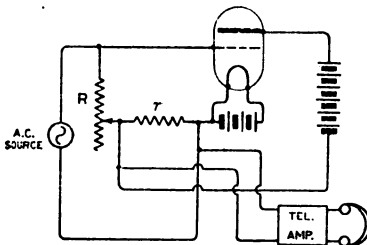
Voltage Amplification Factor of Tube (k) $= \frac{\frac{\delta i_a}{\delta v_g}}{\frac{\delta i_a}{\delta v_a}} = \frac{\delta v_a}{\delta v_g} = \frac{\text{mutual conductance}}{\text{anode conductance}}$

Current amplification Factor of Tube $= \frac{\delta i_a}{\delta i_g} = \frac{\frac{\delta i_a}{\delta v_g}}{\frac{\delta i_g}{\delta v_g}} = \frac{\text{mutual conductance}}{\text{grid conductance}}$

The following methods of measuring the mutual conductance and the voltage amplification constant of a particular tube (from which two quantities the anode conductance can be obtained by dividing the first by the second) are now in common use.

DETERMINATION OF MUTUAL CONDUCTANCE

(APPLETON'S METHOD.)

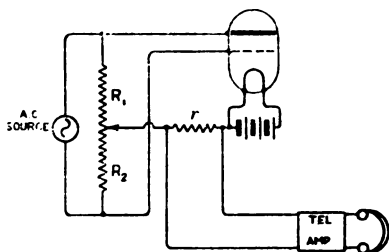


Circuit (1).

In circuit (1) where R and r are non-reactive resistance (r being small) the value of R is adjusted for minimum sound in the telephone-amplifier. The mutual conductance is then given by the equation

$$a_g = \frac{1}{R}$$

DETERMINATION OF VOLTAGE AMPLIFICATION CONSTANT **(MILLER'S METHOD.)**



Circuit (2).

In circuit (2) R_1 and R_2 are non-reactive resistances, preferably quite small (a metre bridge wire is convenient). The ratio of R_1 to R_2 is adjusted to produce minimum sound in the telephone amplifier.

The voltage amplification factor k is then given by the equation

$$k = \frac{R_1}{R_2}$$

Also, the anode conductance is given by $a_a = \frac{a_g}{k} = \frac{R_2}{R_1 R}$

CONVENTIONAL SIGNS USED IN WIRELESS DIAGRAMS

	Continuous Current Motor or Dynamo.		Shielded Capacity.		Microphone.
	Battery.		Ohmic Resistance (Inductionless).		Telephone.
	Alternator of Low or Audio Frequency.		Fixed Self-Inductance.		Aerial or Antenna.
	High Frequency Alternator.		Variable Self-Inductance.		Large Fixed Condensers (generally of low voltage).
	High Tension Transformer.		Iron-Cored Inductance.		
	Iron Core Transformer.		Variometer.		
	Interrupter.		Ammeter and Voltmeter.		
	Spark Gap.		Galvanometer.		
	Rotary Spark Gap.		Thermocouple.		
	Quenched Spark Gap.		Crystal Detector.		
	Arc Generator.				
	Earth Connection.		Thermionic Valve, Two-Electrode. F Filament, A Anode or Plate.		
	Fixed Capacity.		Thermionic Valve, Three-Electrode. A Anode or Plate, G Grid, F Filament.		
	Continuously Variable Capacity.				

**COMPANIES ENGAGED IN THE
COMMERCIAL DEVELOPMENT
OF RADIOTELEGRAPHY AND
RADIOTELEPHONY**

PARTICULARS OF COMPANIES ENGAGED IN THE COMMERCIAL DEVELOPMENT OF WIRELESS TELEGRAPHY & TELEPHONY

Amalgamated Wireless (Australasia), Ltd.

Incorporated.—July 11th, 1913, in the State of New South Wales.

Head Office.—"Wireless House," 97, Clarence Street, Sydney, New South Wales.

Melbourne Office.—422/4, Chancery Lane, Melbourne, Victoria.

New Zealand Office.—"Australasia Chambers," Customs House Quay, Wellington, New Zealand.

Directors.—Hon. Sir Thomas Hughes, M.L.C. (Chairman), C. P. Bartholomew, Esq., Ernest T. Fisk, Esq., Alfred Goninan, Esq., James Taylor, Esq., F.C.P.A., Capt. T. Langley Webb.

Managing Director.—Ernest T. Fisk.

Assistant Manager and Secretary.—J. F. Wilson.

Accountant.—F. W. Larkins, A.I.I.A., A.C.I.S.

Factory Manager.—S. M. Grime.

Sales Manager.—V. Gardiner.

TECHNICAL DEPARTMENT:—Superintendent.—G. Apperley.

MARINE DEPARTMENT:—Traffic Manager.—J. L. Mulholland. **Equipment Manager.**—D. Campbell.

MARCONI SCHOOL:—Manager.—A. R. Mancer.

MELBOURNE BRANCH:—Manager.—L. A. Hooke.

NEW ZEALAND BRANCH:—Manager.—G. Robertson.

Capital.—Authorised £200,000. Issued £160,000 in 160,000 shares of £1 each, all fully paid up. Financial year of the Company ends at June 30th. The annual general meeting is held in August.

The Company owns the sole and perpetual licence to use and exploit all Marconi Patents, also all Patents for the Poulsen Pedersen and Quenched Singing Spark Systems in the Commonwealth of Australia, in the Dominion of New Zealand, and in parts of the Pacific and Indian Oceans.

It has a large organisation for manufacturing wireless telegraph apparatus, erection and operation of stations, and the system is installed on over 200 passenger and cargo ships.

The Company also controls The Wireless Press, Sydney, booksellers and publishers of "Sea, Land and Air," and the Australalectric Company, Sydney, manufacturers and suppliers of Amateur Wireless and all descriptions of electrical apparatus, which Company holds a number of important and exclusive agencies.

Accounts.—The accounts are made up to June 30th in each year. The profit and loss account for the twelve months ended June 30th, 1920, shows that the gross profit from trading account, radio-telegraphic traffic, ships' subsidies, etc., amounted to £47,032 19s. 4d., and after deducting all expenses (including depreciation amounting to £5,389 2s. 5d.) there was a net profit of £8,847 10s. 5d., from which a dividend at the rate of 5 per cent. per annum was paid.

Reserve accounts at June 30th, 1920, stood at £36,314 0s. 8d. Dividends, 1913-14, 4 per cent., 1914-15, 6 per cent.; 1915-16, 5 per cent.; 1916-17, 5 per cent.; 1917-18, 5 per cent.; 1918-19, 5 per cent.; 1919-20, 5 per cent.

American Radio and Research Corporation

Incorporated.—June 15th, 1915.

Head Office.—Medford Hillside, Massachusetts.

Sales Office.—21, Park Row, New York City, New York, U.S.A.

Directors.—J. Axten, Havens Grant, and H. J. Power.

Vice-President and General Manager.—Harold J. Power.

Secretary.—Havens Grant.

Capital.—\$300,000.

Dividends.—Close corporation.

The Company was formed for the operation of Wireless Telegraphy and the manufacture of Wireless Telegraph Apparatus.

Australalectric Company (The)

Formed.—August, 1918.

Head Office.—97, Clarence Street, Sydney, New South Wales.

Works.—242, Kent Street, Sydney, New South Wales.

Branch Offices.—422/4, Chancery Lane, Melbourne, Victoria; "Australasia Chambers," Wellington, New Zealand.

Companies Engaged in Commercial Development of Wireless 1265

Officers.—General Manager, Ernest T. Fisk. Assistant Manager, J. F. Wilson. Sales Manager, V. Gardiner.

The Company is owned and controlled by Amalgamated Wireless (Australasia), Ltd. It was formed for the purpose of exploiting amateur wireless apparatus manufactured by the parent concern. The operations of the Company now embrace the manufacture and sale of general electrical apparatus and accessories.

Some valuable and exclusive agencies are held by the Company, including Relay Automatic Telephones, Diamond Dry Cells, and Ozonair.

Chinese National Wireless Telegraph Company (The)

Incorporated.—Under Special Charter by virtue of an agreement dated May 24th, 1919, between The Government of the Republic of China and Marconi's Wireless Telegraph Company, Ltd.

Office.—5, Peh Ch'a Ta Fu Ssu, Peking.

Directors.—Lieut.-Gen. Ting Ching (Chairman), Rear-Admiral Chen Ngen Tao, Lin Chih Hsiu, Godfrey C. Isaacs, T. A. Barson, A. H. Ginman (Vice-Chairman and Managing Director).

Secretary.—Sohstu G. King.

Capital.—Authorised £700,000 in 700,000 shares of £1 each.

The Company was formed to manufacture, sell and maintain wireless telegraph and telephone apparatus in China, and has been granted a licence by Marconi's Wireless Telegraph Company, Ltd., giving it the sole right to use in China all the Marconi Company's Patents, present and future, for wireless telegraphy and telephony.

Compagnie D'Exploitation Radio-Electrique

Incorporated.—April 24th, 1919.

Head Office.—79, Boulevard Haussmann, Paris.

Directors.—MM. Bousquet (President), Baron de la Chevrelière (Vice-President), N. Pietri, E. Girardeau, E. Sins, Dal Piaz, Musnier, Max Robert, and Tronchon.

Managing Director.—M. N. Pietri.

Capital.—2,500,000 francs, divided into 25,000 shares of 100 francs each.

The Company owns and operates wireless telegraph apparatus on merchant vessels.

The Company also operates aeroplane wireless stations.

Compagnie Générale de Télégraphie Sans Fil

Incorporated.—February 5th, 1918.

Head Office.—79, Boulevard Haussmann, Paris.

Directors.—H. Bousquet (President), Baron de la Chevrelière (Vice-President), A. L. Atthalin, M. Bloch, A. Dupont, E. Girardeau, Godfrey C. Isaacs, E. May, N. Pietri.

Managing Director.—E. Girardeau.

General Manager.—Ernest Sins.

Chief Engineers.—Commander Brenot, Commander Garnier.

Capital.—25,000,000 francs, divided into 50,000 shares of 500 francs each, subscribed and fully paid; 32,000 Parts Bénéficiaires have also been issued.

The financial year ends December 31st.

Companhia Radiotelegrafica Brasileira

Incorporated.—August 14th, 1919.

Head Office.—107, Rua 1º de Marco, Rio de Janeiro.

Directors.—Pedro A. Nolasco Pereira da Cunha, Louis Edgar Sanceau, Dr. Mario de Andrade Ramos, Señor Henrique Lage, Señor Joao Gentil de Mello Araujo, Jack Maurice, Dr. Rodrigo Octavio Filho, and Señor Roberto Cardoso.

President.—Pedro A. Nolasco Pereira da Cunha.

Managing Director.—Louis Edgar Sanceau.

Members of the Fiscal Council.—Dr. Mario de Andrade Ramos, Señor Henrique Lage, Señor Joao Gentil de Mello Araujo.

Members of the Supplementary Council.—Jack Maurice, Dr. Rodrigo Octavio Filho, Señor Roberto Cardoso.

Capital.—Rs.200:000 \$000 (two hundred contos de reis) divided into 2,000 (two thousand) shares of 100\$000 (hundred milreis) each.

The objects of the Company are to exploit the various patents of the Marconi Company and obtain from the Government of Brazil the necessary permission to erect high-power stations for direct communication with Europe and the United States.

Compañía Marconi de Telegrafia Sin Hilos del Río de La Plata

Incorporated.—August 4th, 1906.

Head Office.—Tornquist Building, 132, San Martin, Buenos Aires, Argentina.

Directors.—Captain Guillermo José Nunes (President), Señor Florence O'Driscoll (Managing Director), Colonel Sir Thomas Holdich, K.C.M.G., K.C.I.E., C.B., Godfrey C. Isaacs, Senatore G.

Marconi, G.C.V.O., LL.D., D.Sc., Señor Duncan Munro, Señor J. A. Pilling, Señor Carlos Pereira Pinto, Señor Enrique Schlieper, Sidney F. St. J. Steadman, Señor Antonio Terrarosa.

Secretary.—Enrique Schlieper.

Treasurer.—J. A. Pilling.

Auditor.—Herbert K. James.

Engineer.—E. Berry.

Capital.—\$2,000,000 gold, represented by 250,000 shares of \$5 gold each, series "AA," fully paid, and 150,000 preference shares, 5 per cent. (non-cumulative) of \$5 gold each, series "BB," 35 per cent. has been called up on the "BB" shares. The balance is payable in instalments of 10 per cent. with not less than thirty days' notice. The financial year of the Company ends on May 31st.

The Company owns the Marconi patents and patent rights for the Argentine Republic, and has licences from Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, to work the Marconi system in the Republics of Argentina, Uruguay, and Paraguay. The Company has the permission of the Government to erect wireless telegraph stations within the territorial limits of the Argentine Republic and on vessels flying the Argentine flag. The Company is constructing a high-power wireless station in the Argentine Republic to communicate direct with a similar station in Europe.

Compañía Nacional de Telegrafía Sin Hilos

Incorporated.—December 24th, 1910.

Head Office.—Calle de Alcalá, 43, Madrid.

Branch Offices.—Ronda de la Universidad 35, Barcelona; Buenos Aires 13, Bilbao.

Directors.—Excmo. Sr. General Don José de Bascaran; Excmo. Sr. Senatore G. Marconi, G.C.V.O., LL.D., D.Sc.; Godfrey C. Isaacs; Excmo. Sr. Don Antonio Comyn, Conde V. de Abliz; Excmo. Sr. Don José Sanchez Guerra; Sr. Don Eduardo Estelat; Sr. Don Francisco Setuain; Sr. Don Jaime Macnaughtan, Sr. Don José Asensio, and Sr. Don Manuel Moreno Quesada.

Secretary.—Sr. Don José Asensio.

Capital.—6,500,000 pesetas, divided into 8,000 6 per cent. Participating Preference shares of 500 pesetas each, and 5,000 Ordinary shares of 500 pesetas each, all issued and fully paid.

The financial year ends on December 31st.

This Company took over the concession from the Spanish Government for the construction and exploitation of a public wireless telegraph service in Spain and its colonies. The Company has ten wireless telegraph land stations erected and working at Aranjuez, near Madrid, Cadiz, Barcelona, Tenerife, Las Palmas, Vigo, Soller, Finisterre, Santander, and Cape Palos, and has further stations in course of construction. The Company holds an exclusive licence from Marconi's Wireless Telegraph Company, Limited, to use and exploit its patents in Spain and her colonies.

The Company has established a direct wireless telegraph service between Spain and England, and also conducts services with Germany via Aranjuez and Hanover; Austria via Barcelona and Deutsch-Altenburg; Hungary via Barcelona and Budapest; and Italy via Barcelona and Centocelle (Rome).

Drahtloser Übersee-Verkehr A.G. (Transradio)

Founded.—1918.

Head Office.—Berlin S.W.11, Hallesches-Ufer 12/13.

Founded by the Allgemeine Elektrizitätsgesellschaft, Siemens & Halske A.G. and the Gesellschaft für drahtlose Telegraphie m.b.H. (Telefunken), Berlin. The Company was formed to exploit installations for wireless telegraphy and telephony in Germany and other countries.

Directors.—Fritz Ulfers, Karl Solff, Otto Betz (Vice-Director).

The Company has substantial interests in the Transradio, Compañia Radiotelegrafica Argentina S.A., Buenos Aires.

Federal Telegraph Company (The)

Incorporated.—In the State of California, in 1911.

Offices.—Hobart Building, San Francisco, California, and 400, Homer Building, Washington, D.C.

Factory.—Palo Alto, California.

Directors.—R. P. Schwerin, Leon Bocqueraz, Hiram W. Johnson, Jun., Alexander Hamilton, and R. R. Beal.

President.—R. P. Schwerin.

Vice-President.—Leon Bocqueraz.

Secretary.—Augustus Taylor.

Treasurer.—J. E. Godcharles.

Capital.—\$2,500,000; 250,000 shares, par value each \$10.

The Company was formed for the operation of wireless telegraphy and the manufacture of the Poulsen Arc and other wireless sets.

Gesellschaft für Drahtlose Telegraphie m.b.H. (Telefunken)

Incorporated.—June 15th, 1903.

Head Office.—Hallesches Ufer 12/13, Berlin.

Directors.—Count von Arco, Dr. ing. C. Schapira, Fritz Ulfers, Karl Solff (Vice-Director).

Founded by the Allgemeine Elektrizitäts-Gesellschaft, Berlin, and Siemens and Halske A.G., Berlin, for the exploitation of the patents of Professor Slaby, Professor Braun, and Count von Arco all over the world.

The Company, whose shares are in the sole possession of the Allgemeine Elektrizitäts Gesellschaft and Siemens and Halske, Berlin, is interested in the following companies:—

Deutsche Betriebsgesellschaft für drahtlose Telegraphie m.b.H., Berlin, S.W.

Deutsche Südseegesellschaft für drahtlose Telegraphie A. G., Berlin.

Drahtloser Übersee-Verkehr, Aktiengesellschaft (Transradio), Berlin.

Eilvase G.m.b.H., Berlin.

Transradio Compania Radiotelegrafica-Argentina S.A. Buenos Aires.

Atlantic Communication Company, New York.

Telefunken East Asiatic Wireless Telegraph Company, Shanghai.

Independent Wireless Telegraph Company, Inc.

Incorporated.—February 12th, 1919, in the State of Delaware, U.S.A.

Head Office.—42, Broadway, New York City, New York, U.S.A.

European Office.—7, Hobart Place, London, S.W.1, England.

Factory.—Port Chester, New York, U.S.A.

Directors.—P. R. Mallory, C. J. Pannill, F. K. Leatherbee, C. D. Mallory, and J. B. Smull

President.—P. R. Mallory.

Vice-President and General Manager.—C. J. Pannill.

Treasurer.—F. K. Leatherbee.

European Superintendent.—D. J. Heilig.

Capital and Dividends.—Close Corporation.

The Company was formed for the operation of wireless telegraphy and the manufacture of wireless telegraph apparatus.

Marconi International Marine Communication Company, Limited (The

Incorporated.—April 25th, 1900.

Head Office.—Marconi House, Strand, London, W.C.2.

Directors.—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc., M.I.E.E., Godfrey C. Isaacs (Managing Director), Alfonso Marconi, Capt. H. Riall Sankey, C.B., C.B.E., R.E. (retired), Henry W. Allen, F.C.I.S., W. W. Bradfield, C.B.E., M. A. Bramston, S. F. St. J. Steadman, Sir Charles J. Stewart, K.B.E., Rt. Hon. Lord Herschell, G.C.V.O., and Lt.-Col. A. Simpson, C.M.G.

Joint General Managers.—W. W. Bradfield, C.B.E., Henry W. Allen, F.C.I.S., and Lt.-Col. A. Simpson, C.M.G.

Assistant General Managers.—G. E. Turnbull and H. W. Corby.

Secretary.—F. Arkin, F.C.I.S.

Marine Superintendent.—Capt. C. V. Daly.

Traffic Manager.—W. R. Cross.

Contract Manager.—A. R. Harding.

Technical Adviser.—Captain J. A. Sloc, C.B.E., R.N.

Capital.—£1,500,000 in shares of £1 each, issued and fully paid £1,192,726. (The capital was increased in May, 1919, by 900,000 shares of £1 each, of which 600,000 were offered to existing shareholders pro rata at par.) 5½ per cent. First Mortgage debentures (bearer)—authorised £250,000, issued £125,000, outstanding £96,380. Secured (without trust deed) as a floating charge on the undertaking and all the property. Redeemable at par, July 1st, 1941. Interest payable, January 1st and July 1st.

Accounts and Dividends.—Accounts are made up to December 31st and usually submitted in June following. The accounts at December 31st, 1919, showed a profit of £340,798 19s. 3d. for the year, and after payment of dividend and reserve for repayment of debentures, £161,890 1s. 3d. was carried forward subject to excess profits duty for 1916, 1917, 1918 and 1919. General Reserve Account £258,013 13s.

Dividends paid, 1910, 5 per cent.; 1911, 7 per cent.; 1912, 10 per cent.; 1913, 10 per cent.; 1914, 10 per cent.; 1915, 12½ per cent.; 1916, 15 per cent.; 1917, 15 per cent.; 1918, 15 per cent.; 1919, 15 per cent.

Last Bearer Coupon paid, No. 17.

This Company was formed for the purpose of working throughout the world, except in the United States of America, Hawaii, Chili, and colonies or dependencies of those States, an exclusive licence for all maritime (being mercantile or yachting) purposes granted by Marconi's Wireless Telegraph Company, Limited. The Company has transferred to Associated Companies its rights in Canada, Argentina, Uruguay, Australasia, and all European countries and their dependencies except the United Kingdom and Italy. This Company owns and operates the wireless telegraph apparatus on about 3,000 vessels of the mercantile marine.

Marconi Scientific Instrument Company, Limited (The)**Incorporated.**—November 1st, 1919.**Registered Office and Works.**—21/25, St. Anne's Court, Dean Street, Soho, London, W.C.**Directors.**—William W. Drury (Managing Director), Henry W. Allan, F.C.I.S., W. W. Bradfield, C.B.E., C. Mitchell, Chas. B. Ward.**Secretary.**—Chas. B. Ward.**Capital.**—Authorised £20,000 in 20,000 shares of £1 each.

The Company was formed to manufacture and sell amateur telegraphic and telephonic apparatus; to manufacture apparatus under licence from Marconi's Wireless Telegraph Company, Limited; to repair and refashion obsolete apparatus, etc.

"Marconi" Societate Anonimă Română Pentru Industria Si Comerțul de Materiale Telegrafice Telefonice Si Electrice**Incorporated.**—April 3rd, 1920.**Temporary address of Head Office.**—Palatul Casei de Credit a Poste, Bucurest.**Directors.**—Senator Guliemo Marconi, G.C.V.O., LL.D., D.Sc. (President), Constantin Olanescu (Vice-President), Maurice Blank, D. D. Burilleau, Al. Tzigara-Samurcas, Constantin Neamtzu, Godfrey Charles Isaacs, Sidney F. St. J. Steadman, Colonel John Ernest Cochrane, D.S.O., Bertram Coryn, Eugen Porn.**Managing Directors.**—Constantin Olanescu, Colonel John Ernest Cochrane, D.S.O., Eugen Porn.**General Manager and Secretary.**—Eugen Craioveanu.**Capital.**—Lei, 6,000,000. 12,000 fully paid-up shares of lei 500 each.

The Company was formed for the manufacture of, and trade in, all kinds of telegraphic and telephonic materials and apparatus, and their installations, wireless and other apparatus, and of industry, trade and installations, and exploitation, in connection with electricity and its application.

Marconi Wireless Telegraph Company of Canada, Limited (The)**Head Office.**—11, Saint Sacrament Street, Montreal, Canada.**President.**—Lieut.-Col. The Hon. Frederic Nicholls.**Vice-Presidents.**—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc., Robert Bickerdike, A. E. Dymont.**Directors.**—Sir William Mackenzie, Godfrey C. Isaacs, G. M. Bosworth, C. G. Greenshields, K.C.**Managing Director.**—A. H. Morse, A.M.I.E.E. (London), Mem.Inst.R.E. (New York).**Manager.**—A. L. W. MacCallum.**Comptroller and Acting Secretary.**—J. P. Fleming.**Traffic Manager.**—G. H. Pearson, Assoc.I.R.E. (New York).**Chief Engineer.**—J. O. G. Cann, M.I.(A).E.E., Mem.Inst.R.E. (New York).**Authorised Capital.**—\$7,500,000 in 3,000,000 shares of \$2.50 each.**Issued Capital.**—2,400,000 shares.

The Company has sole wireless rights under all Marconi and G.E.C. Patents in the Dominions of Canada and Newfoundland. It is the only Company in Canada manufacturing wireless apparatus and providing wireless service. It owns and operates the wireless equipment on nearly two hundred ships of the Canadian and Newfoundland Mercantile Marines, and also owns and operates the duplex, transatlantic, commercial wireless telegraph station at Glace Bay in Nova Scotia.

The Company operates, under contract with the Canadian and Newfoundland Governments, forty wireless stations in the Great Lakes, Gulf of St. Lawrence, and on the Atlantic Coast. It has branch offices in Vancouver, B.C., Winnipeg, Man., Toronto, Ont., St. John, N.B. (winter), and St. John's (Nfld.). It owns and operates Schools of Radiotelegraphy in Montreal, Toronto, and St. John's (Nfld.).

Marconi's Wireless Telegraph Company, Limited**Incorporated.**—July 20th, 1897, as "Wireless Telegraph and Signal Co., Ltd."; name changed as above in March, 1900.**Head Office.**—Marconi House, Strand, London, W.C.2.**Works.**—Chelmsford, Essex.**Directors.**—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc. (Chairman), Godfrey C. Isaacs (Deputy-Chairman and Managing Director), Captain H. Riall Sankey, C.B., C.B.E., R.E. (retired), Samuel Georgebegan, M.I.Mech.E., M.Inst.C.E.I., Alfonso Marconi, W. W. Bradfield, C.B.E., Henry W. Allen, F.C.I.S., M. A. Bramston, S. F. St. J. Steadman, Sir Charles J. Stewart, K.B.E., Rt. Hon. Lord Herschell, G.C.V.O., and Lt.-Col. Adrian Simpson, C.M.G., R.E. (retired).**Joint General Managers.**—W. W. Bradfield, C.B.E., Henry W. Allen, F.C.I.S., and Lt.-Col. Simpson, C.M.G., R.E. (retired).**Assistant General Managers.**—G. E. Turnbull and H. W. Corby, F.C.I.S.**Secretary.**—F. Atkin, F.C.I.S.**Chief Engineer.**—Andrew Gray, M.I.E.E., A.M.Inst.C.E.

The Company was formed to acquire Senatore Marconi's patents for wireless telegraphy in all countries except Italy, its colonies and dependencies, and has since acquired a large number of other patents relating to wireless telegraphy, including those of Sir Oliver Lodge, the General Electric Company of New York (except for America), etc.

It has substantial interests in various subsidiary and affiliated Companies.

The Company conducts public wireless telegraph services, and messages are accepted for transmission, via Marconi, to the United States of America, Canada, Australia, New Zealand, the West Indies, British Guiana, British Honduras, Spain, etc.

Accounts and Dividends.—Accounts and dividends are made up to December 31st, and usually submitted in June following. The Company's accounts at December 31st, 1919, showed shares at cost in Associated Companies and Patents, £1,923,172 10s. 11d. (par value, £2,251,882 4s. 3d.) and General Reserve Account, £1,250,000. The profit for the year was £1,684,526 7s. 1d., and after payment of dividend, £955,202 7s. 1d. was carried forward.

In respect of each of the years 1911, 1912 and 1913, the Company paid dividends of 17 per cent. on the Preference shares and 20 per cent. on the Ordinary shares; in respect of 1914 and 1915, 7 per cent. Preference and 10 per cent. Ordinary dividends were paid; in respect of 1916 the dividends were 12 per cent. on the Preference shares and 15 per cent. on the Ordinary shares; in respect of 1917 the dividends were 17 per cent. on Preference shares and 20 per cent. on the Ordinary shares. For 1918 dividends of 22 per cent. on the Preference shares and 25 per cent. on the Ordinary shares were paid. For 1919 dividends of 22 per cent. on the Preference shares and 25 per cent. on the Ordinary shares were paid, plus a bonus of 5s. per share on both Preference and Ordinary shares.

(Last Bearer Coupons paid: No. 19 Preference, No. 18 Ordinary.)

Capital.—Authorised £3,000,000 in 2,750,000 Ordinary shares of £1 each, and 250,000 Cumulative Participating Preference shares of £1 each. The Preference shares are entitled to a cumulative dividend of 7 per cent., and, after the Ordinary shares have received a 10 per cent. non-cumulative dividend, to share *pari passu* with the latter shares in surplus profits remaining. Issued (November, 1920) 250,000 Preference shares and 2,616,609 Ordinary shares. In November, 1919, the authorised capital was increased by the creation of 1,500,000 Ordinary shares, which were offered in December, 1919, to existing shareholders *pro rata* at a premium of £2 per share. The shares thus created rank for dividends declared in respect of the period commencing January 1st, 1920.

Nederlandsche Seintoestellen Fabriek

Incorporated.—February 27th, 1918.

Head Office and Works.—Groest 104/106, Hilversum, Holland.

Directors.—Bern E. Ruys (President), D. Hudig L. Jzn (Commissaire Délégué), A. J. M. Goudriaan, J. H. Hummel, A. E. J. Bertling, A. Veder, G. C. Isaacs, G. E. Turnbull.

Manager.—A. Dubois.

Capital.—2,000,000 florins, divided into 2,000 shares of 1,000 florins each.

The financial year ends December 31st.

The Company was formed for the purpose of exploiting a factory or factories for the manufacture of installations, apparatus and tools destined for or relating to wireless telegraphy, telephony, signalling apparatus, etc., and trading in the above-mentioned apparatus. It has entered into an agreement with Marconi's Wireless Telegraph Company, Limited, whereby the latter Company grants to the N.S.F. the exclusive right to manufacture and sell in Holland and the Dutch Colonies wireless material according to its Patents and designs, present and future.

Nederlandsche Telegraaf Maatschappij, "Radio-Holland"

Incorporated.—December 6th, 1916.

Head Office.—562 Keizersgracht, Amsterdam.

Directors.—J. B. A. Jonckheer (President), D. Hudig L. Jzn (Vice-President), J. Rypperda Wierdsma, A. J. M. Goudriaan, J. Wilmink, P. J. Roosegaarde Bisschop, H. Colyn, Prof. C. L. van der Blit, Senatore G. Marconi, Godfrey C. Isaacs, Maurice Travailleux, Gaston Périet.

Managing Director.—L. H. F. Wackers.

Administrator, Dutch East Indies.—Th. P. van den Bergh.

Capital.—3,000,000 florins, divided into 3,000 shares of 1,000 florins each, of which 2,000 shares have been issued and fully paid.

The financial year ends at December 31st.

The Company was formed for the purpose of the establishment, sale, hire, control and exploitation of wireless telegraph and wireless telephone stations on vessels of the mercantile marine of Holland and its colonies.

Norsk Marconikompani Aktieselskap

Constituted.—November 28th, 1918.

Head Office.—Nygaten 2B, Christiania.

Capital.—1,250,000 Kroner, divided into 1,250 registered shares of Kroner 1,000 each.

Directors.—Consul-General O. J. Storm (Chairman), Commander J. Bull, Godfrey C. Isaacs, Maurice Travailleux, Otto Thoresen.

Deputy-Directors.—Commander B. L. Gottwaldt, E. S. Skottun, and A. Hubert.

Technical Manager.—Commander B. L. Gottwaldt.

Commercial Managers.—Messrs. Storm and Bull, Ltd., Christiania.

This Company was constituted for the manufacture, sale, and rental of apparatus for Wireless Telegraphy, Telephony, Signalling, etc., and other business in connection therewith. It has acquired the Marconi patent rights, present and future, for use in Norway.

Pan-American Wireless Telegraph and Telephone Company (The)

Incorporated.—State of Delaware, U.S.A. Amended Certificate of Incorporation, October 18th, 1917.

Office.—233, Broadway, New York City.

Directors.—Hon. John W. Griggs, Edward J. Nally, James R. Sheffield, David Sarnoff, Edward W. Harden, Albert G. Davis, C. B. Coady, R. Mainzer, R. P. Schwerin.

Chairman.—Hon. J. W. Griggs.

President and General Manager.—Edward J. Nally.

Vice-President and Commercial Manager.—David Sarnoff.

Secretary.—Charles J. Ross.

Treasurer.—George S. De Sousa.

Capital.—3,500 shares 7 per cent. preferred stock of \$100 each, cumulative after January 1st, 1921; 50,000 shares common stock, no par value. The financial year ends December 31st.

The Company has the exclusive right and licence to use the Marconi and Poulsen Patents for the sole purpose of radio or wireless communication between the United States of America and all countries of South America, Central America, Mexico, the Islands of Cuba, Porto Rico, and the West Indies.

Radio Communication Company, Limited

Incorporated.—March 14th, 1919.

Head Office.—34/35, Norfolk Street, London, W.C.2.

Directors.—T. W. Stratford-Andrews (Chairman), Sir Wm. R. Brooke, K.C.I.E., J. Herbert Scrutton, B. Binyon, O.B.E. (Managing Director).

Secretary.—E. A. B. Snoaden.

Capital.—£200,000, divided into 100,000 6 per cent. Cumulative Participating Preference shares and 100,000 Ordinary shares. Issued: 79,502 Ordinary and 65,500 Preference.

The Company was formed under the aegis of the Indo-European Telegraph Company, Limited, for the manufacture, sale and operation of radio apparatus, including "Polar" radio equipment for ships.

Radio Corporation of America

Incorporated.—October 17th, 1919, in the State of Delaware.

New York Office.—Woolworth Building, 233, Broadway, New York City.

Directors.—Owen D. Young (Chairman), E. J. Nally (President), E. W. Rice, Jun., Hon. John W. Griggs (General Counsel), James R. Sheffield, A. G. Davis, Gordon Abbott, Edward W. Harden, F. A. Stevenson, and W. S. Gifford.

Secretary and Comptroller.—Charles J. Ross.

Treasurer.—George S. de Sousa.

Capital.—Authorised: \$25,000,000 Preferred Stock in 5,000,000 shares of \$5 each. There are also 5,000,000 Common shares of no par value. Issued: \$10,675,870 in 2,135,174 Preferred shares of \$5 each, fully paid. 4,030,000 Common shares of no par value. Rights: The Preferred Stock is entitled to receive dividends of 7 per cent. per annum and no more. In any distribution of the assets it is entitled to be paid off at par, prior to any payment to the Common shareholders. The Preferred dividends are cumulative after the fiscal year ending in or with the calendar year 1923, and the Preferred Stock may be retired on any day on which a dividend thereon shall be payable, at \$5.50 per share and accrued dividends.

The Company was formed to acquire certain assets of The Marconi Wireless Telegraph Company of America and all wireless inventions, present and future, of the General Electric Company of New York.

R.M. Radio Limited

Registered.—September 6th, 1919.

Head Office.—5, Chancery Lane, London, W.C.2.

Engineers' Offices and Show-Rooms.—18 and 19, Whitefriars Street, E.C.4.

Directors.—H. R. Rivers-Moore, W. H. Merriman, H. de A. Donisthorpe, L. J. Graham, A. G. Ionides, A. E. Snape.

Secretary.—G. Horswell.

Capital.—£10,000.

The Company was formed for the purpose of constructing, supplying, maintaining and operating radiotelegraphic and telephonic apparatus of all kinds for the purpose of intercommunication on land, at sea, and in the air.

Russian Company of Wireless Telegraphs and Telephones (The)

Incorporated.—October 8th, 1908.

Head Office.—14, Lopouchinskaja, Petrograd, Russia.

Directors.—Senator G. Marconi, G.C.V.O., LL.D., D.Sc., G. C. Isaacs, S. M. Eisenstein, Pierre de Balinski, M. Salberg, Lt.-Col. Adrian Simpson, C.M.G., R.E. (Managing Director), Admiral I. F. Bostrem, I.R.N. (retired), L. M. Eisenstein (Deputy Director).

Secretary.—Leon Eisenstein.

Capital.—Originally 1,200,000 roubles in 12,000 shares of 100 roubles each. This capital was

increased to 1,800,000 roubles in November, 1911, in order to enable the Company to acquire a licence from Marconi's Wireless Telegraph Company, Limited. The capital was further increased in 1913 to 2,400,000 roubles, and in 1914 to 3,000,000 roubles, divided into 30,000 shares of 100 roubles each.

The financial year ends December 31st (Russian date).

Dividends.—In respect of the years 1912 and 1913 dividends of 6 per cent. have been paid and 15 per cent. in respect of 1914 and 1915, and 17 per cent. for 1916.

The Company owns the Russian patents taken out in the name of S. M. Eisenstein, and also holds an exclusive licence to use and exploit the Marconi Company's patents in Russia (excluding stations for international communication or on vessels of Russian Mercantile Marine).

(N.B.—Owing to the political situation in Russia it has not been possible to revise the particulars concerning the above Company.)

Société Anonyme Internationale de Télégraphie Sans Fil

Incorporated.—March 31st, 1913.

Head Office.—13, Rue Bréderode, Brussels.

Capital.—4,500,000 francs, divided into 9,000 shares of 500 francs each, all issued; 4,500 shares are fully paid, and the remaining 4,500 shares are 100 francs paid.

The last dividend paid was 15 per cent. for the year 1919.

The financial year ends at December 31st.

The Company exploits wireless telegraphy on vessels of the mercantile marine of all European countries excepting the United Kingdom of Great Britain and Ireland, Germany, Austria-Hungary Italy and France, and at the present time owns and operates wireless telegraph apparatus on nearly 600 vessels.

Société Française Radio-Electrique, Société Anonyme

Incorporated.—April 4th, 1910.

Head Office.—79, Boulevard Haussmann, Paris.

Laboratory.—Suresnes (Seine), 51, Rue Carnot.

Works.—Levallois-Perret (Seine), 2, Quai Michelet.

Big Machine Works.—Belfort: Société Alsacienne de Constructions Mécaniques.

Tower and Pillar Works.—Venissieux (Rhône), 72, Chemin du Moulin à Vent à Parilly.

Chairman.—M. Henri Bousquet.

Vice-Chairman.—M. G. Ferrand.

Financial Director.—M. A. Fondère.

Managing Director.—M. E. Girardeau.

Directors.—Comte de Beaumont, Baron de La Chevrelière, P. Desachy, A. Dupont, N. Pietri, O. de Rivaud.

Technical Manager.—Major P. Brenot.

Technical Advisers.—MM. Bethenod, Latour, Boucherot, De Bellescize, Petit.

Capital.—7,000,000 francs, divided into 70,000 shares of 100 francs each, all issued and paid up.

The Company manufactures wireless telegraph apparatus and engines, and erects wireless stations, and also owns and operates the patents of MM. J. Bethenod, E. Girardeau, M. Latour, etc.

It exploits chiefly that system of wireless telegraphy which employs high-frequency machines, the system adopted for all the great stations of France and its Colonies and by various other Governments.

Société Indépendante Belge de Télégraphie Sans Fil, Société Anonyme

Incorporated.—January 29th, 1920.

Head Office.—23, Boulevard de Waterloo, Brussels.

Directors.—M. le Baron Henri Lambert (President), MM. Braillard (Managing Director), Decorat Vanderhaeghen, Van Halteren.

Manager.—M. Jamotte.

Capital.—1,000,000 francs, divided into 2,000 shares of 500 francs each.

Spanish and General Corporation (The), Limited

Incorporated.—April 19th, 1920.

Head Office.—Marconi House, Strand, London, W.C.2.

Directors.—Godfrey C. Isaacs (Chairman and Managing Director), Alfonso Marconi, Captain H. Riall Sankey, C.B., C.B.E., R.E. (retired), S. F. St. J. Steadman, Lt.-Col. C. E. P. Sankey, D.S.O., R.E. (retired).

Joint Secretaries.—F. Atkin, F.C.I.S., A. S. Birch.

Capital.—Authorized, £500,000 in 500,000 shares of £1 each. Issued (November, 1920) 342,587 shares of £1 each. The Company was formed to take over the liabilities and assets of the Spanish

and General Wireless Trust, Limited, and, in addition to carrying on the business of that Company, to transact generally the business of a Financial Corporation.

Shareholders of the Spanish and General Wireless Trust, Limited, were offered one share of the Corporation in respect of every share of the Trust held by them.

Wireless Speciality Apparatus Company

Incorporated.—June 14th, 1907, New York.

Head Office.—131, State Street, Boston, Massachusetts, U.S.A.

Directors.—George S. Davis, William Newsome, Eugene W. Ong, Philip Farnsworth, Greenleaf W. Pickard, Herbert R. Jenney, Victor M. Cutter.

President.—George S. Davis.

Vice-President.—William Newsome.

Secretary.—John L. Warren.

Chief Engineer.—William H. Priess.

Capital.—\$700,000.

The fiscal year ends December 31st of each year.

The Company is engaged in the manufacture of radio apparatus exclusively, and has the exclusive rights to the patents of Professor Greenleaf Whittier Pickard, the inventor of the so-called "Crystal Detectors" and the radio "Pelorus," sometimes called radio direction finder.

BIOGRAPHICAL S E C T I O N

(A) Biographies.

(B) Obituary Notices.

BIOGRAPHICAL NOTICES

Abraham, Henri.—General Secretary of the Société Française de Physique, 1901 to 1913, now Professor of Physics at the Sorbonne in Paris.

Alexanderson, Ernst Fredrik Werner.—Chief Engineer, Radio Corporation of America. B. Upsala, Sweden, January 25th, 1878. Educ. at the High School and University of Lund, Sweden, and at the Royal Institute of Technology, Stockholm, completing a post-graduate course at Berlin. Entered the service of the C. and O. Electric Company, 1901. Joined the General Electric Company, 1902. Occupies the post of consulting engineer to the latter concern. Introduced iron into the manufacture of high frequency circuits, and originated the development of 2, 50 and 200 kw. radio frequency alternators and the magnetic amplifier. The first 200 kw. radio frequency alternator and magnetic amplifier for radiotelegraphic work designed by Mr. Alexanderson was installed in the Marconi Company's station at New Brunswick, N.J., and has now been adopted by the Radio Corporation of America for all of its high power stations. Also developed the "barage" receiver and kindred inventions. Has carried on notable pioneer work in duplex radio telephony. Holds a number of United States patents. Member of the American Institute of Electrical Engineers. Fellow of the Institute of Radio Engineers. Author of over twenty scientific papers read before various technical societies. Address: Woolworth Building, New York.

Allen, Henry W., F.C.I.S. (1902). Joint General Manager, Marconi's Wireless Telegraph Company, Ltd., and Marconi International Intercommunication Company, Ltd. (1919). B. 1870. Met Senatore Marconi, 1896. Assisted (1897) in formation of the Wireless Telegraph and Signal Co., Ltd., afterwards becoming secretary to that company. Secretary of Marconi International Marine Communication Co., Ltd., and Assistant Manager of Marconi's Wireless Telegraph Co., Ltd. (1900). Deputy Manager, Marconi's Wireless Telegraph Co., Ltd. (1910). Elected to a seat on the Board of each company, 1917.

Appleby, Thomas.—B. May 10th, 1886, near Newcastle-on-Tyne, England. Arrived in America, 1888. Commenced wireless experiments, 1899. Went to sea, 1909, as radio operator. September, 1909, in charge of United Wireless Station at Atlantic City, N.J. April, 1912, in charge of Wanamaker-Marconi Service between New York and Philadelphia Wanamaker Stores. April 9th, 1917, commissioned in the U.S. Navy as a Lieutenant (J.G.) for Radio Engineering. Ordered to the Office of the Director of Naval Communications, Navy Department, Washington, D.C. Author of U.S. "Wartime Radio Instructions for Merchant Vessels." Spring of 1918, established shore radio compass stations for the detection and location of enemy vessels in West Atlantic. Selected the sites and supervised the erection, installation and calibration of shore radio compass stations erected on Atlantic coast of United States from Cross Island, Maine, to

Gulf of Mexico. Spring of 1919, selected sites for shore radio compass stations on the Pacific Coast of the United States. April 24th, 1919, promoted Senior Lieutenant, U.S. Navy. August 7th, 1919, released from active duty, U.S. Navy. August 8th, 1919, Radio Engineer in the Office of the Director of Naval Communications and given entire charge of all shore radio compass stations in the United States. November 15th, 1919, resigned from Navy Department to enter profession of Patent Lawyer. Full Member of the Institute of Radio Engineers, New York. Address: 5847, Ellsworth Street, Philadelphia, Pa., U.S.A.

Appleton, Edward Victor, M.A. (Cantab.), M.Sc. (Lond.), Fellow of St. John's College, Cambridge. B. Bradford, 1892. Educ. St. John's College, Cambridge. First-class Honours in National Science Tripos, Parts I. and II. (Physics). Served European War, 1914-1919, as Captain W.T. R.E. Specially interested in Thermionic Valves. Engaged in Valve Research, Cavendish Laboratory, Cambridge. Member of Thermionic Valve Sub-Committee, Radio Research Board, Department of Scientific and Industrial Research. Address: St. John's College, Cambridge.

Arco, Graf Georg von.—B. Grossgorschütz, Germany. Educ. at Berlin University and Technical High School, Charlottenburg. Assistant to the late Professor Slaby in the department of wireless telegraphy, 1898; later joined the Allgemeine Elektrizitäts Gesellschaft, Berlin, continuing at the same time his work on the Slaby-Arco system of wireless telegraphy. Manager of the Gesellschaft für Drahtlose Telegraphie, 1903. Carried out practical wireless telephony over a distance of 35 km. (21.7 miles), 1906. Exhibited high frequency alternator with static frequency step-up transformers at the International Radiotelegraph Congress in London, 1912. This arrangement is now used in the high power-station of Nauen, generating 400 kw. in the aerial and used for telegraphy and telephony. Address: Tempelhof, Berlin, Albrechtstrasse 49/50.

Armstrong, Edwin H., Professor at Columbia University and President of the Radio Club of America. B. in U.S.A., December 18th, 1890. Graduated at Columbia University in 1913. Has undertaken radiotelegraphic work in conjunction with Professor Pupin at the Columbia Laboratories. He is himself a director of the Institute of Radio Engineers, and was recently awarded the medal of the Institute. Served two years in A.E.F. as Captain and Major in the Signal Corps. Decoration: Chevalier Légion d'Honneur. Present address: Columbia University, New York City.

Asano, Dr. Osuke.—B. 1859. Graduated at the Engineering College of the Tokyo Imperial University, 1881. Honorary Professor, Tokyo University. Director of the Electro-Technical Laboratory of the Department of Communications, 1897. Retired, 1919. Took many trips to Europe and America, first for the investigation of electrical engineering; second as a Japanese delegate of the International Wireless

Telegraph Conference, Berlin, 1906; and third as a Japanese delegate of the International Conference on Electrical Units and Standards, London, 1908. Pioneer of wireless investigation in Japan, and his investigation has continued since 1897. The so-called "Teishinsho" wireless system is due to his investigations. Laid the submarine cable between Formosa and Osumi in 1895-97, the first long-distance submarine cable ever laid by a Japanese at that time. Raised to the rank of Dr. Engineer, 1899. Supervises all electrical works in Japan. Awarded 2nd Order of Merit, 1914.

Asin, Don Humberto de, Engineer-in-Chief of the Radiotelegraph Service of Bolivia. Studied electricity at the University of Santiago. Chief of important technical sections, railways of Guayaquil y Arica at La Paz. Studied radiotelegraphy. Visited San Cristobal, Lima, the School of Santiago, and the two installations which were then at the Docks, Buenos Aires. Commissioned by Bolivian Government to visit Europe. Graduated as radiotelegraphist at the Marconi Company's professional school at Broomfield. Visited Germany to study the Broomfield system. Installed six stations in Bolivia and will instal Trinidad, Cobija, Villa Bella, Concepción, Magdalena, San Ignacio, Puerto Suárez, Santa Cruz, Todos Santos, and many more.

Athanasiadis, Capt. C.—B. Athens, 1878. Educ. Royal Naval College, 1892. Commissioned in the Navy, 1896, and after eleven years' active service became interested in wireless telegraphy. Supervised the erection of the first wireless installations in Greece. Sent to London, 1909, by his Government as the head of a mission for the construction of Greek wireless stations. Remained in England for a year and a half, and during that period came into close contact with the Marconi organisation. On his return to Greece he was appointed head of the Radio Telegraph Service of the Navy, a position which he still holds. Author of the standard Greek instructional books in wireless, and has achieved some successes in the realms of poetry and the drama. Address: 45, Nikis Str., Athens.

Austin, Louis Winslow, Ph.D.—Head of the U.S. Naval Radiotelegraphic Laboratory, Washington, D.C., since 1908. Son of Professor L. A. Austin, of Middlebury College. Educ. Middlebury College, Clark University, and the Universities of Strassburg and Berlin. Assistant professor of physics at the University of Wisconsin, then joined the staff of the Physikalisch-Technische Reichsanstalt, Berlin. Dr. Austin is especially interested in quantitative high-frequency measurements. Delegate to the London International Radiotelegraphic Conference. President of the Institute of Radio Engineers, 1914. Address: Radio Building, Bureau of Standards, Washington, D.C.

Ballantine, Stuart.—B. September 22nd, 1897, Philadelphia, Pa. Educ. Philadelphia Public Schools, studied mathematics at Drexel Institute. Engaged in electro-chemical research, H. K. Mulford Company, 1916: and telephone engineer, Bell Telephone Company, 1916-17. Took up development of radio compass for U.S. Navy Department, and was in charge of this work from 1917-20. At present pursuing special studies in mathematical physics at Harvard University. Address: 15, Sumner Road, Cambridge, Mass., U.S.A.

Ballantyne, Hon. Charles Colquhoun.—Minister of Marine and Fisheries, and Minister of the Naval Service of Canada. B. August, 9th, 1867,

Dundas County, Ontario. Educ. local Public School and Commercial College, Montreal. He has been connected with the Militia for many years, and raised a battalion of the Grenadier Guards of Canada for overseas service, 1916. Member of the Montreal Harbour Commissioners. Privy Councillor, October 3rd, 1917. Minister of Public Works. Resigned that portfolio. Minister of Marine and Fisheries and Minister of the Naval Service, October 13th, 1917. Elected to the House of Commons for the St. Lawrence-St. George Division of Montreal, 1917. Independent in politics. Member of the Presbyterian Church. Member of the Mount Royal, St. James, Canada, Forest and Stream, Jockey and Hunt Clubs, Montreal, and of the Rideau Club, Ottawa. Addresses: Ottawa and Montreal.

Bangay, Raymond D.—B. Lyme Regis, 1883. Educ. Epsom College and Finsbury Technical College. Joined the Marconi Company, 1902. Spent five years in America, during which time was engaged in different branches of the Service. Returned to England and studied Military Wireless Stations. Chief of the Field Station Department, Marconi's Wireless Telegraph Co., Ltd., 1914. Author of "The Elementary Principles of Wireless Telegraphy," and "The Oscillation Valve." Address: Gresham Cottage, Brentwood, Essex.

Beggerow, Dr. Hans.—Admiralty Counsellor since June, 1914. B. September 30th, 1874. Educ. University of Berlin, and Freiburg-in-Breisgau, where he obtained his Doctorate. From 1901 till 1919 chief expert adviser to the German Admiralty in all matters concerning wireless telegraphy. Similar position in the Prussian Army, 1906-14. Retired November, 1919. Address: Berlin, W.15, Meierottstr. 3.

Bellini, Dr. Ettore.—B. Foligno, Italy, April 13th, 1876. Educ. Naples University. Electrical Engineer to the Royal Italian Navy, 1901. Chief of the Naval Electrical Laboratory at Venice, 1906. Responsible for carrying out research work dealing with the employment of wireless telegraphy on warships and submarines. Joint inventor with Capt. Tosi, of the Radiogoniometer, an apparatus for directive wireless telegraphy.

Bethenod, J. F. J.—Consulting Engineer to the French Société Radio-Electrique. B. Lyons, 1883. Educ. Central School of that city. For a number of years acted as the Assistant of Professor André Blondel. From 1903 onward, published a large number of theoretical articles on Electro-Dynamic Machinery, and has entered into business relationship with a number of Constructional Engineering Houses for the exploitation of his inventions. After a term of military service in the Engineers, specialised in wireless telegraphy. In this field, both scientific investigation and industrial practice owe several important contributions to his activities. A number of wireless stations of varying power have been installed, wherein his devices are utilised. Of recent years, M. Bethenod has turned his attention to high-frequency alternators, and has built machines giving remarkable results.

Bhering, Francisco. Professor of Geodesy and Astronomy in the Polytechnic School of Rio de Janeiro. Director of the Technical Branch of the Telegraphic Administration. B. Uberaba, State of Minas Geraes, Brazil, January 1st, 1867. Under his initiation and supervision survey and mapping of Brazil undertaken in unified maps on the scale of one millimetre per kilometre. Represented Brazil as delegate at the Inter-

national Telegraphic Conference of 1903, at the Radiotelegraphic Conference, London, in 1912, and at the Time Conference, 1912. Member of the mixed Civil and Military Commission organised to deal with wireless matters. Author of a number of works on civil engineering, geography, and telegraphy. Address: Rua Conde Irajá No. 111, Rio de Janeiro, Brazil.

Bjarnov, Alexander William.—Telegraph engineer, cand.-polyt., Eng.-in-Chief of the Danish Telegraph Dept.'s Third Engineering District; Fellow of Danish Engineers' Ass. and of the Electrotechnic Association (Elektroteknisk Forening); member of the Board from 1911 to 1919; Associate of the American Scandinavian Foundation. B. Copenhagen, 1874. Studied Polytechnic Academy, Copenhagen. Attached to the Telegraph Dept. since 1903. Passed through the Naval and Torpedo Department Spark Telegraph School for Officers in 1907. Since 1909, together with Helmuth Schledermann, has supervised the examination of wireless operators and the inspection of wireless stations on board ships flying the Danish flag. Address: Gl. Kongevej 96, Copenhagen V.

Bjoerkman, S. O. V.—B. 1883. Since 1911 Superintendent of the Wireless Station at Nya Varvet, near Gothenburg, Sweden. Address: Nordhemsgatan 33, Gothenburg.

Blandy, Col. Lyster Pettipiece, D.S.O.—Controller of Communications at the Air Ministry; Officer of the Legion of Honour; Chevalier of the Order of the Crown of Belgium; Mons Star with bar; General Service and Victory Medals; Croix de Guerre of Belgium. B. September 21st, 1874. Educ. Haileybury College and Royal Military Academy, Woolwich. Entered Royal Engineers, March, 1895; Captain, 1904; Major, 1914. From 1908–12 Inspector Royal Engineers Stores at Woolwich, during which period he had much to do with Army Field Wireless Sets. In the start of 1913 took over command of a small unit of thirty to forty men, the Wireless Signal Company. In charge of Wireless personnel in the British Expeditionary Force 1917. From 1914–17 in charge of Wireless Communication of the B.E.F., France. Became Chief Experimental Officer of Army Signals Experimental Establishment, July, 1917. Chief Experimental Officer, R.A.F., April, 1918, and thence transferred to present post. Address: Naval and Military Club, London.

Blondel, André E.—B. Chaumont, France, 1863. Graduated at Paris University. Contributor to learned societies and technical journals on several subjects, including wireless telegraphy. Invented (1893) a new apparatus, which is known as the "Oscillograph," and which opened a fresh field for the study of alternate currents. Was the first to explain, mathematically (1893), the effect of inertia in the hunting of alternators. Among his other activities in wireless telegraph, mention should be made of directed waves produced by a double aerial oscillating on the fifth harmonic, and also of a system of acoustically syntonic wireless telegraphy.

Blondlot, Professor Prosper René.—B. Nancy, 1849. After completing his scientific studies in Paris, returned to Nancy. Became Professor at the Faculty of Sciences. Now Hon. Professor and Correspondent of the Institute of France. Devoted considerable study to the problem of electromagnetic waves, the main object of his researches being to determine the speed of propagation of such waves. In 1891 he found

for this speed the value 302,200 km. per second, and, in 1893, by another and quite different method, the value 297,200 km. per second. Has also investigated the laws of propagation of wireless waves in various media.

Bradfield, William Walter, C.B.E.—Joint General Manager, Marconi's Wireless Telegraph Company, Ltd., and Marconi International Intercommunication Company, Ltd. B. London, 1879. Entered the Wireless Telegraph and Signal Co., Ltd., 1897. Electrical assistant to Senatore Marconi all through the course of the latter's experimental work in Radiotelegraphy on Salisbury Plain during 1897. Installed the first wireless apparatus on British battleships, 1899, and a little later assisted in demonstrations to the United States Government on board the United States battleship "Massachusetts." In 1901 similar demonstrations conducted by him for the French Government resulted in the establishment of wireless communication between the French Riviera and Corsica. Supervised in 1901 the erection of the well-known station at Siasconset and the Nantucket Lightship. Chief Engineer to the Marconi Wireless Telegraph Co. of America, 1902. Deputy Manager of the Marconi's Wireless Telegraph Company, and of the Marconi International Marine Communication Co., Ltd. Manager of both concerns, 1910. Elected to the Board of the two companies, 1917. Address: 1, St. James's Place, London, S.W.

Brailard, Raymond, General Manager, Société Indépendante Belge de Télégraphie sans Fil. B. 1888, Dept. of Jura, France. Studied engineering at the Ecole des Arts et Métiers, Cluny, and Ecole Supérieure d'Electricité, Paris. Served two years in the electrical industry. Military service at the Eiffel Tower Wireless Station. Engineer of the Société Française Radio Electrique. Visited Belgian Congo (1911) as Chief Engineer of Wireless Telegraphy. Installed the network of Congolese Stations. Before the war installed the powerful station at Laeken, near Brussels. Secretary of the International Commission on Scientific Wireless Telegraphy. During the war attached first to the Wireless Service of the Belgian Army, then to the Wireless Station at Croix d'Hins (Bordeaux). Author of several scientific papers. Address: 23, Boulevard de Waterloo, Brussels.

Branly, Edouard.—B. Amiens, October 23rd, 1844. Educ. St. Quentin College and Henry IV College, Paris. Fellow of the University, Doctor of Physical Science, and Doctor of Medicine. Some of his works relate to the electrical conductivity of radio-conductors. International Jury of Superior Precept Instruction awarded him (1900) *grand prix* for his exhibition of radio-conductors. French Minister of Public Instruction made him an Officer of the Legion of Honour in recognition of the part he had played in connection with the discovery of "Wireless Telegraphy." Has constructed various independent distributing apparatus for producing telemechanical effects without wires. Elected a member of the Academy of Science, Paris, January, 1911.

Brenot, Commandant Paul.—B. Ruoms, Ardèche, September 19th, 1880. Educ. Ecole Polytechnique. Transferred to the Central Establishment of Radiotelegraphy, and supervised the installation of wireless at most of the military stations, both permanent and mobile. Represented wireless telegraphy at the International Electrical Congress at Marseilles, 1908, and later on collaborated with M. Blondel in various investigations into the employment of

aircraft for radiogoniometry and high on arcs for wireless telegraphy and tele-
 ly. Carried through some important experi-
 on the employment of wireless telegraphy
 aircraft, 1910-11, which gained for their
 ator the Cross of the Legion of Honour.
 re the war, head of the practical work in
 dvanced wireless school. Technical adviser
 ne Minister of the Colonies, 1911, and took
 the organisation of the Colonial systems,
 ularly those applying to communication
 en the various Colonial units. Delegate
 e Colonial Office at the International Radio-
 graphic Conference, London, 1912; at the
 national Time Conference, Paris, 1912-13;
 at the International Safety-at-Sea Con-
 ce, London, 1913-14. During the war,
 t remaining in charge of French Colonial
 ss, appointed head of the Radiotelegraphic
 e at Paris and of the Eiffel Tower Station.
 Army, 1919. Became Technical Manager
 e Société Française Radio-Électrique and
 lting Engineer to the Compagnie Générale
 légraphie sans Fil.

ght, Sir Charles, F.R.S.E., M.Inst.C.E.,
 e.S., M.I.Mech.E., M.I.E.E., F.I.Radio.E.,
 .S., F.S.S.—B. London, 1863. Educ.
 ng College and King's College. Engineer and
 ician for the construction, testing, laying
 pairing of over 25,000 miles of submarine
 Gave special expert evidence before
 Departmental Cables Communication
 mtee (1902), House of Commons Radio-
 aphic Committee (1907), and Dominions
 Commission (1911). Member of R.F.C.
 Enquiry Committee (1916), and of British
 ation War and Engineering Committee
 . Contributed papers, addresses and lec-
 o numerous learned societies. Author of
 s standard works, notably "Submarine
 aphs," "The Story of the Atlantic
 " "The Administration of Imperial Tele-
 " and "Telegraphy, Aeronautics and
 Represented Australia as sole delegate
 International Radiotelegraphic Conference
 Vice-President, Wireless Society of
 n and Institute of Aeronautical Engineers.
 es: Leigh Grange, Tonbridge, and
 eum Club, Pall Mall, London, S.W.1.

yn, Frank James, C.B.E., M.A., B.Sc.—
 5 near York. Educ. privately. Grad.
 a University (Honours and Prizeman).
 d the Higher Division of the Civil Service,
 Appointed to the Post Office. Principal
 1910. Assistan Secretary in charge of
 phs, March, 1919. Member of British
 Delegation, 1919, in capacity of expert
 on telegraph questions. Post Office
 ntative on Imperial Communications
 tee, and Member of Wireless Telegraph
 mtee of that Committee. Member of
 Wireless Telegraphy Committee ap-
 y Government in 1919 to formulate a
 of W/T for the Empire. Senior British
 e to Conference at Washington on Tele-
 communications, 1920. Address: G.P.O.,

n, Sidney George, M.I.E.E.—B. 1873,
 U.S.A., of English parents, and brought
 up when eighteen months old. Educ.
 ate and London University. Made a
 study of submarine telegraphy and is
 of the magnifying cable relay. Invented
 n cable relay and the magnetic shunt,
 since that date he has also devoted
 ntention to telephony and wireless tele-
 and has achieved some important
 such as the carbon telephone relay,
 e transmission on land trunk lines, the

improved wireless telephone receiver, and other
 inventions. Vice-President of the Wireless
 Society of London.

Bucher, Elmer E.—B. Akron, Ohio, November
 11th, 1885. Educ. Academy Oberlin, Ohio.
 Joined the De Forest Wireless Telegraph Com-
 pany as experimental engineer, 1903. Con-
 structed several high-power stations in the
 Middle West and on the Gulf Coast for this
 firm. Joined the United Wireless Telegraph
 Company as installation and experimental
 engineer, 1907. Installed the first ship stations
 of the United States Navy. Organised the
 United Wireless Telegraph Company's School,
 1909. Instructing engineer and chief inspector
 of that company for more than two years.
 Associated himself with the Y.M.C.A., New
 York, in the initiation of wireless schools, 1910.
 Joined the Marconi Wireless Telegraph Company
 of America as instructing engineer, 1912. Or-
 ganised Marconi Institute, 1917, and acted in
 capacity of Director. Joined Commercial De-
 partment, Radio Corporation of America, 1920.
 Devoted many years to experimental long-
 distance wireless work and holds a large number
 of U.S. wireless patents. Held position as
 Technical Editor of "Wireless Age" during the
 period 1913-18. Author of "Practical Wireless
 Telegraphy," "Vacuum Tubes in Wireless
 Communication," "Wireless Experimenters'
 Manual," and other works. Member of the
 Institute of Radio Engineers.

Bullard, Rear-Admiral W. H. G., U.S.N.—B.
 December 6th, 1866, State of Pennsylvania,
 U.S.A. Graduated, United States Naval
 Academy, 1886. Served on ships of the Navy
 on the Atlantic, South Atlantic, Pacific and
 Asiatic Stations, with shore duty, with particu-
 lar reference to the science of Electrical Engineer-
 ing, in which he had specialised. First Superin-
 tendent of the Naval Radio Service, 1912-16.
 Under his supervision the communication
 system of the Navy Department was developed
 and enlarged. Delegate-plenipotentiary of the
 United States at the International Conference
 for Safety of Life at Sea, London, November,
 1913. In charge, on behalf of the United
 States Navy, of the wireless operations con-
 tained in the series of experiments carried out
 between the Eiffel Tower and Arlington to
 determine longitude by means of wireless tele-
 graphy. During the World War his sea service
 was in the Sixth Battle Squadron of the British
 Grand Fleet, serving in the North Sea. After
 the war he returned to Washington in charge
 of the Communication Service of the Navy
 Department, with the title "Director Naval
 Communications," the former Radio Service
 having been enlarged to include all forms of
 communication.

Burstyn, Dr. W.—B. Austria, 1877. Educ.
 Vienna University. Started his career as
 electrical engineer with the Siemens-Schuckert
 Werke, Charlottenburg. Later engineer with
 Gesellschaft für Drahtlose Telegraphie. De-
 veloped together with Baron Lepel (1907-12)
 the quenched spark system. Now at Physics
 and Technical Laboratory and is *privatdozent*
 for wireless telegraphy and electric clinics,
 Technical High School, Charlottenburg. Ad-
 dress: Berlin—Wilmsdorf, Prinzregenten-
 strasse 23.

Carpentier, Jules.—Member of the Académie
 des Sciences, Bureau des Longitudes, Com-
 mander of the Legion of Honour, President of
 the Société de Publications Radiotechniques.
 B. Paris, 1851. Joined Ecole Polytechnique,
 1871. Commenced work with the State Rail-

ways. In 1876 appointed Principal Stores Engineer of Lyons Railway Company. For his electrical work shown at the Electrical Exhibition of 1881, he obtained the Gold Medal and the Cross of Chevalier of the Legion of Honour. Later became President of several learned Societies. Entered the Bureau des Longitudes, 1897. Invented several pieces of mechanism for musical instruments and photographic apparatus. Inventor of a type of periscope for submarines. Interested himself from the beginning in radiotelegraphy. Founder of the Compagnie Générale Radiotélégraphique, which was later absorbed by the Compagnie Générale de Télégraphie sans Fil.

Gastañon, Lieut.-Col. Don Luis, Spanish Royal Engineers, 1st Chief of Field Wireless Battalion.—B. 1867. One of the pioneers of Wireless Telegraphy in the Spanish Army. Designed and supervised the construction of the Wireless Army Station of Carabanchel EGC (Madrid), the most powerful station of the Spanish Army. Since 1904 in charge of Wireless affairs at the Centro Electrotécnico y de Comunicaciones, Madrid. Distinguished himself in military matters. Took part in the Mindanao, Luzon (Philippine Islands) and Spanish-American campaigns, and was seriously wounded in action. Possessor of twenty-six decorations for military and technical merit, besides one promotion obtained for war merits.

Chaffee, Professor E. L., Assistant Professor of Physics, Harvard University.—B. April 15th, 1885, Somerville, Mass. Educ. High School, Somerville, and Massachusetts Institute of Technology in Boston. Graduated B.S. in Electrical Engineering, 1907. Awarded the degree of M.A. in Physics, Harvard University, 1908, and Ph.D., 1911. Conducted courses in physics and radiotelegraphy at Harvard University. Engaged in research and consultation work in radiotelegraphy. Author of several papers, including "A New Method of Impact Excitation of Electric Oscillations and their Analysis by the Braun Tube Oscillograph," published 1911. During the war engaged in developing some radio apparatus, with which he experimented in France, 1918.

Chamberlain, Eugene Tyler.—Son of General Frank Chamberlain. B. in Albany, N.Y., September 28th, 1856. Educ. Albany Academy and Harvard College. Graduated with honours in Metaphysics, 1878. In business for two years, then took up journalism and acted as legislative and political correspondent to the Associated Press. Came to Washington, 1893. Appointed Commissioner of Navigation by President Cleveland. In 1903, on the creation of the Department of Commerce and Labour, he joined others in urging the importance of wireless telegraphy as a means of promoting safety of life on merchant vessels at sea, and he has since played a prominent part in promoting legislation on this subject. Delegate for the U.S.A. to the Convention on Safety of Life at Sea, at London, 1914. Address: Department of Commerce, Bureau Navigation, Washington, D.C.

Chevallière, Jean Marie Charles Aymé, Baron de la.—B. Poitiers, France, 1858. Educ. in that city. Member of Parliament, Mayor and General Counsellor. After a course at the Military Academy of St. Cyr (1877-79), followed by specialised training at Saumur, remained for fifteen years in the active army as cavalry officer, retiring with the grade of captain in the Reserve, 1892. Member of Légion d'Honneur, Military class. Mobilised from August 2nd, 1914, to July 5th, 1917. Joined the Board

of the Belgian "Société Anonyme de T.S.F." 1901, and subsequently took a prominent part in the initiation of the "Compagnie Française Maritime et Coloniale de T.S.F." now known as "Compagnie Industrielle de Mécanique et d'Electricité," of which he is President and Managing Director. From early 1914 to the end of January, 1918, occupied the post of managing director of the Cie Universelle de Télégraphie et de Téléphonie sans Fil, which on February 12th of the same year was merged in the Cie. Générale de T.S.F., of which he is vice-president. Also Director of "Société Française Radiélectrique" and "Compagnie d'Exploitation Radiélectrique." Address: 23, rue Dumont d'Urville, Paris.

Childs, H. B. T. A.F.R.A.S., A.M.I.E.E.—Chief of Aircraft Dept. Marconi's Wireless Telegraph Co., Ltd. B. Llandilo, S. Wales, 1884. Educ. King's School, Canterbury; London University. Joined the Marconi Company, 1905. Served as Engineer in Russia, Canada, Spain, and Egypt. Joined Royal Flying Corps, autumn, 1915. Served in France, November, 1915, to August, 1917. Appointed to command W/T Experimental Establishment, R.A.F., August, 1917. Promoted Lieut.-Col., December, 1917. Appointed in charge of W/T for the R.A.F. in France, May, 1918, till April, 1919. Mentioned in dispatches, 1916, 1918. Address: Holdenhurst, Oatlands Avenue, Weybridge.

Chree, Charles.—Superintendent of Kew Observatory since 1893. B. 1860, Lintrathen, Forfarshire. Sc.D. of Cambridge, Hon. LL.D. (Aberdeen), F.R.S. Graduated M.A. Aberdeen (1879) with first-class honours in Mathematics and Natural Philosophy. At Cambridge, in 1883, was sixth wrangler, gaining also first-class honours in Mathematical and Natural Sciences Triposes. Fellow of King's College, Cambridge (1885); re-elected Research Fellow (1891). ex-President of Physical Society of London; member of the British Association Committee for Radiotelegraphic Investigation. Holds Watt Medal of Institution of Civil Engineers. Largely concerned with geophysics, especially terrestrial magnetism and atmospheric electricity. For his researches in the former subject received Hughes Medal from the Royal Society. Publications: "Studies in Terrestrial Magnetism," articles in "Encyclopædia Britannica." Address: 75, Church Road, Richmond, Surrey.

Cohen, Louis, Ph.D., Consulting Engineer.—B. 1876. Educ. at Armour Institute of Technology, University of Chicago, and Columbia University. On scientific staff of the Bureau of Standards, 1905-09. Chief of Research Department of the National Electric Signalling Co., 1910-12. Engaged in consulting practice since 1912. Professor of Electrical Engineering, George Washington University. Especially interested in the subject of electrical oscillations. Author of "Formulae and Tables for the Calculation of Alternating Current Problems," and scientific and technical papers dealing with problems in wireless telegraphy and kindred subjects.

Coursey, Philip R., B.Sc. (Eng.), A.M.I.E.E., F.P.S.L., Assistant Editor "The Radio Review."—B. 1892. Educ. University College, London. Awarded Diploma in Electrical Engineering with Distinction. Graduated with first-class Honours in Electrical Engineering at the University of London. Subsequently acted as Assistant to Dr. J. A. Fleming, F.R.S., in the Electrical Engineering Department and Research Laboratories of University College, London. From 1915-18 served as Inspector of Wireless Tele-

graph Apparatus for the Admiralty; afterwards appointed to the Staff of H.M. Signal School, Portsmouth, as Research Physicist. Some time Research Electrical Engineer to the Dubilier Condenser Co. Author of papers on Radiotelegraphy and Telephony, read before a number of Societies, and of "Telephony without Wires." Address: 14, Woodland Villas, Muswell Hill Road, N.10.

Craioveanu, Eugen.—B. 1872. Secondary studies and Grad. in Physics and Chemical Science. Sent by Roumanian Post Office Dept. to study as Telegraph Engineer at Ecole Supérieure des Postes et Télégraphes, Paris, and Post und Telegraphen Hochschule, Berlin. Engineer in all Chemical Branches of Telegraphy and Telephony, Roumanian Post Office. District Director, Chief of Telegraph Postal Service during Balkan War (1913), and also 1916 to 1917. Sub-Director-General of Roumanian Posts, Telegraphs and Telephones, January, 1920. Resigned August 1st, 1920. Engaged in research for modernising technical telegraphy and telephony. Studied wireless thoroughly and now Director-General of Roumanian Marconi Company. Address: Palatul Casei de Credit a Postei, Bucharest.

Crawley, Lieut.-Col. C. G., Royal Marine Artillery (ret.), M.I.E.E., Deputy Inspector of Wireless Telegraphy, General Post Office. Employed at Wireless Telegraphy in the Navy, 1903 to 1913, as Experimental, Instructional, and Fleet Wireless Officer. Deputy Inspector of Fleet Wireless Telegraphy in the Post Office, 1913. Returned to the Naval Wireless service (1914) for the period of the war. During the war served in the Grand Fleet, in command of the R.N.V.R. Wireless School, at the Admiralty, and supervised the erection and working of various Naval stations abroad. Mentioned in Gazette for valuable services, and received letters of appreciation from the Admiralty. Officer of the Order of Aviz. Order of Liakat. R.H.S. testimonial for saving life. Resumed his duties in the Post Office, 1919. Address: General Post Office, London, E.C.

Cresswell, F. G., A.M.I.E.E.—Radio Commander in the Australian Navy. Entered upon professional career, 1897, and received his training and experience with engineering firms in Australia. Entered Government service in the Electrical Engineer's Branch of the Postmaster-General's Department, Melbourne. Commissioned in the Naval Forces of the Commonwealth as Engineer Sub-Lieutenant detailed for electrical duties, 1907. Served in the Royal Australian Navy from the time of its inauguration. Appointed Fleet Wireless Telegraph Officer, 1912, rising to the rank of Radio Commander and Acting Director of the Radio Service, July, 1916. On his return from naval operations in the Pacific during the early stages of the late war, was selected to take over the control, under the Naval Board, of the Wireless Telegraphy Department of the Commonwealth, which had been transferred by Act of Parliament to the control of the Royal Australian Navy. His first work was that of organising the Commonwealth Radio Service on naval lines and under naval discipline. Assisted at the capture of the German high-power wireless stations at Samoa, Nauvu, and Rabaul, being mentioned in despatches for distinguished service. Member of the Institute of Electrical Engineers (Australia). Address: Naval Radio Service, Collins House, Melbourne.

Cross, Professor Charles B.—B. at Troy, New York, March 29th, 1848. Returned with his

father to Newbray Port, Massachusetts, 1862. Graduated at the Putnam Free School in that city, 1865, and engaged temporarily in teaching. Graduated at Massachusetts Institute of Technology, 1870. Appointed instructor in Physics. Became a Junior Professor in Physics, 1875. Placed in charge of the Dept. of Physics, 1877, and later Thayer Professor of Physics and Director of the Rogen Laboratory of Physics. Became interested in the industrial applications of electricity. Lectured upon this subject, 1881. Retired from active teaching, 1918, and made Professor Emeritus. Author of papers embodying the results of researches upon electric and acoustic subjects. Has delivered many public lectures, a number of which were before the Lowell Institute of Boston. Acted as expert for the American Bell Telephone Company throughout the extended litigation concerning the Bell patents, as well as in other telephone cases. Expert for the American Marconi Company in the suits which resulted in the establishment of its fundamental patents. Fellow of the American Academy of Arts and Sciences. Chairman of the Rumford Committee of that institution for twenty-two years. President of the Elizabeth Thompson Science Fund, a member of the American Association for the Advancement of Science, the British Association for the Advancement of Science, and of the American Institute of Electrical Engineers, of which he was one of the original vice-presidents. Past Chairman of one of the three Lectures of the Electrical Congress at the World's Columbian Exhibition at Chicago, 1893.

De Forest, Dr. Lee.—B. Council Bluffs, Iowa, August 26th, 1873. Graduated Ph.D., 1899. Founded the De Forest Wireless Telegraph Co., 1902, the Radio Telephone Co., and the De Forest Radio Telephone Co., 1907. Awarded gold medal for radiotelegraphic work, St. Louis Exhibition, 1904. He distinguished himself in the American-Spanish War, 1898: Member of the Institute of Electrical Engineers of the Franklin Institute, and of the Institute of Radio Engineers.

De Groot, Doctor Engineer Cornelis Johannes, Chief of the Radiotelegraphic Service in the Dutch East Indies.—B. at Den Helder, January 27th, 1883. Educ. as Mechanical Engineer at Technical High School, Delft, and afterwards at Karlsruhe, where he obtained the diploma of Electrical Engineer. During 1915-16 took degree as Doctor in Technical Sciences at Delft University. Spent eighteen months in the service of the G.E.C. of Berlin and thence transferred himself to the Dutch East Indian Government, superintending the erection of various wireless stations in the Indian Archipelago. In 1915-16 visited Europe on furlough and took Doctor's degree on the thesis of "Radiotelegraphy in the Tropics," a notable production which obtained him much *kudos* when subsequently published. A supplementary dissertation upholding the advisability and technical possibility of establishing direct radio communication between Holland and its Colonies won him the honour of having his Doctor's degree conferred *cum laude*, and he was subsequently instructed to carry into practical effect the measures he advocated in that essay. His initial experiments in establishing such communications met with success. Has made many contributions to radio literature, one of the best known being a monograph on "The Nature and Elimination of Strays," originally read before the Institute of Radio Engineers, New York.

Desbarats, George Joseph, C.M.G., B.Sc., Deputy Minister and Comptroller of the Canadian

Naval Service, since June, 1910.—B. Quebec, January 27th, 1861. Educ. Public Schools; Terrebbonne College, Ecole Polytechnique, Montreal (honours and gold medal, 1879); Laval University (B.A.Sc., 1901). Engineer on construction of canals and other public works: assistant to late John Page, Chief Engineer of Canals; Inspector, Railway Construction, B.C., 1892-96; Engineer of Construction, Galop's Canal, 1896-99; employed in hydraulic survey work, St. Lawrence River, three years; rebuilt and enlarged the Government shipyard, Sorel, Quebec, 1901; Acting Deputy Minister of Marine and Fisheries, Ottawa, 1908-09; Deputy Minister, 1909-10; Plenipotentiary for Canada at the Radiotelegraph Conference held at London, England, 1912. Member of the Canadian Society Civil Engineers, 1897; Councillor, 1907; Vice-President, 1909; Councillor, Ecole Polytechnique, 1909; Plenipotentiary for Canada to International Seaman's Conference, Genoa, 1920. Address: Ottawa, Canada.

Destruge, Guillermo, Director General of Telegraphs, Telephones and Wireless, Ecuador, February, 1898, to February, 1906, and from March, 1912, in which capacity he is still serving. Established duplex telegraphic system and telephones in Quito, the capital, 1900. The installation of wireless telegraphy in Ecuador has been instituted under his direction. President of the Radiotelegraphic Commission of the Republic. The personnel of the Telegraphic and Telephonic service of Ecuador presented to him on August 10th, 1920, as an appreciation of his good work, an artistic and valuable gold tablet inscribed. Author of several scientific publications. Address: Apartado No. 59, Quito, Ecuador, South America.

De Valbrenze, R.—One of the first promoters of the use of undamped waves. Presented (1902) an important memorandum to the French Ministry of War on this subject. Attached as Officer of Engineers to the Central Establishment of Military Telegraph *Matériel*. In this capacity studied means for producing undamped waves by means of mercury arcs. Left Army for industry. Published (1906) a work on wireless telegraphy. During the war was a Captain of Engineers attached to the Radiotelegraphic Centre in Paris. Sometime Vice-President of the Société Internationale des Electriciens. Director of several Technical Societies. Chevalier of the Legion of Honour.

De Vasconcellos e Sa, Dr. Alexandre, State Secretary of the Portuguese Colonies.—B. November 28th, 1872. Graduated as a Doctor of Medicine in the Medical School at Lisbon. Joined the Portuguese Navy, 1894, where he gained a reputation as a physician and surgeon. After the proclamation of the Portuguese Republic in 1910 interested himself in politics, and as a member of Parliament specialised in Colonial subjects. Served in the Barú Campaign, 1912. Chief Health Officer to the expedition sent to Cuamato when the Germans invaded Portuguese territory, 1913-15. His services won him the highest military distinction granted by the Portuguese Navy. On returning from the expedition to Angola was appointed Commissioner of the Portuguese Government to the Mozambique Company. Secretary of State to the Colonies, May 14th, 1918. In this capacity devoted considerable attention to the development of radiotelegraphy in the Portuguese colonies.

Dubilier, William.—B. July 25th, 1888, in the U.S.A. Consulting radio engineer and inventor. Devoted much attention to wireless

telegraph, telephone, and high-frequency experiments. Since 1904 Consulting radio engineer. Principal of the Dubilier Electrical Syndicate, Ltd., London, England, and of the Dubilier Condenser Co., Inc., New York. Inventor of the Dubilier Mica Condenser. Obtained over 150 patents and applications for wireless apparatus. Address: Aero Club, New York.

Eccles, W. H., B.Sc., A.R.C.S., M.I.E.E., Professor of Applied Physics and Electrical Engineering at the City and Guilds of London Technical College, Finsbury, E.C.; Vice-President of the Physical Society; Member of Council and Chairman of the Wireless Section of the Institution of Electrical Engineers; Examiner in mathematics at the London University, and honorary secretary of the British Association Committee for Radiotelegraphic Investigation.—B. Furness, Lancs, 1875. Entered the Royal College of Science, South Kensington, in 1894. Three years later was appointed demonstrator in the Physics Laboratory at the College, and in 1898 graduated at the London University with first-class honours in Physics. In 1899 he entered Mr. Marconi's laboratory at Chelmsford and spent a great part of his time in the investigation of electrical oscillations of air wires and in "jiggers." Devised a laboratory method for testing and classifying coherers, and results of a later study of coherers were presented as one of his D.Sc. theses. In 1901 was appointed Head of the department of mathematics and physics at the South-Western Polytechnic, Chelsea, and afterwards University Reader in Graphics at University College, London. Address: 2, Ryder Street, St. James's, S.W.1.

Eichhorn, Gustav, Ph.D.—B. Düsseldorf (Germany), December 1st, 1867. Studied Physics. After the sudden death of his father became managing director of the paternal paper-mills for ten years. Returned to the profession of his choice and continued his interrupted studies. After three years at Berlin, Munich, and Zürich, took the degree (Phil. Dr.) at the last-named University. Entered the wireless telegraph laboratory of Prof. Braun-Siemens and Halske, in Berlin. Appointed manager of their experimental stations on the Baltic, where for about eighteen months he conducted a number of investigations. Collaborator of various technical journals. Inventor of the buzzer-device which is used in connection with wave-meters and other instruments to use same as oscillators. Returned to Zürich, 1905, and launched the *Jahrbuch de drahtlosen Telegraphie und Telefonie*, 1907. Engaged in practical and theoretical work in wireless telegraphy and telephony. Address: Hauptpostfach 6123, Zürich, Switzerland.

Eisenstein, S. M.—B. Kief, Russia. Educ. Kief University. Studied at the University of Berlin and the Charlottenburg Polytechnic. First turned his attention to wireless telegraphy, 1900. Obtained his preliminary wireless patent and established a private experimental laboratory, 1904. General Soukominoff, then commanding the troops of the Kief Division, heard of the young wireless enthusiast and encouraged him to carry out experiments on a large scale, eventually prevailing on the Russian War Office to provide the young scientist with sites for the erection of stations. The action, taken in consequence by the War Office, resulted in the realisation of the necessity for forming a wireless company; the project speedily materialised and Mr. Eisenstein changed his headquarters from Kief to Petrograd. The new departure

speedily justified itself, and in 1911 the original company coalesced with the Marconi Company, and the reconstructed Russian Organisation, with Mr. Eisenstein as Director and Principal Technical Adviser, assumed responsibility for the development of Russian wireless.

Erskine-Murray, James, D.Sc., F.R.S.E., M.I.E.E., F.I.Radio E.—B. Edinburgh, October 24th, 1868. After six years' study and research under the late Lord Kelvin at Glasgow University entered Trinity College, Cambridge, as a research student. Assistant Professor of Physics and Electrical Engineering in the Heriot-Watt College, Edinburgh, 1896-98. Appointed experimental assistant to Mr. Marconi, 1898. Lecturer and Demonstrator in Physics and Electrical Engineering at University College, Nottingham, 1900. Lecturer in Electrical Engineering at the George Coates Technical College, Paisley, 1905. Consulting work in radiotelegraphy, 1905. Lecturer on Radiotelegraphy at the Northampton Institute, London, 1907-11. Contributed papers to numerous learned societies. Author of several works on wireless telegraphy. Partner in the firm of Clark, Forde, Taylor, and Erskine-Murray, consulting engineers, 1913-18. Joined the Royal Naval Volunteer Reserve, 1917, with rank of Lieut.-Commander. Now serving with the Royal Air Force in charge of the design of wireless instruments and of experimental work. Address: 16, Elmfield Road, Bromley, Kent; Telephone, Bromley 858; Club, Caledonian.

Ewen, Harry Alexander.—B. Aberdeen, December 17th, 1877. Educ. Aberdeen Grammar School; Liverpool Institute. Received Engineering training at Heriot-Watt College. Medallist in Elec. Eng. and Elec. Eng. Hons., 1901-02. Joined Engineering Staff of Marconi's W/T Co., 1902. Appointed Wireless Telegraph Expert to the Brazilian Navy, 1910; later rejoined Marconi's W/T Co., and appointed Chief of Drawing and Design Dept. Address: "Braeside," Priest Lane, Shenfield, Essex.

Farrand, C. L.—B. Newark, N.J., October 22nd, 1891. Educ. Central High School, Philadelphia, Pa. Wireless operator and instructor, 1909-13. Inspector of construction work, 1913, testing and designing of coastal stations. Assistant to Mr. H. Shoemaker, the research engineer of the Marconi Laboratory, Aldene, N.J. Engineer-designer in Aldene, N.J., 1917, especially devoting his attention to radiotelegraphic research and design. His research work has been particularly associated with the De Forest Valve litigation, the development of valves, and the elimination of static. His activities have been mainly exercised in connection with the design of commercial and naval quenched spark apparatus, regenerative valve receivers and regenerative valve transmitters, both telephonic and telegraphic.

Ferrié, General Gustave, Technical Director of French Military Radiotelegraphy. Officer of the Legion of Honour, D.Sc. of the University of Oxford, Companion of St. Michael and St. George, Commander of the Crown of Italy, Officer of the White Eagle of Serbia, Holder of the Distinguished Service Medal of the United States, Commander of the Double Dragon of China, Officer of La Couronne.—B. at St. Michel de Maurienne (Savoy), November 19th, 1868. His connection with wireless telegraphy started February, 1899, when he was present during experiments of Senatore Marconi between Wimeux and Dover. Initiated French Military Radiotelegraphic Service in 1900. Was member of French Delegation to the International

Electrical Congress of St. Louis in 1904. Member of the French Delegation to the International Radiotelegraphic Conference of London (1912). Appointed General Secretary of the International Time Conference, Paris (1913). He has, in the course of a brilliant career, written a large number of monographs and periodic contributions dealing with radiotelegraphy and kindred subjects, both from a technical and organisation point of view. Address: Ministère de la Guerre, Paris.

Fessenden, Reginald Aubrey.—B. Milton, Canada, October 6th, 1866. Educ. New York and Port Hope, Ontario. Inspecting engineer to the Edison Company, N.Y., 1866. Took up teaching work and conducted classes in physics and electrical engineering at Western University, 1892. Professor of Electrical Engineering at Western University, Philadelphia, 1893. Special Agent to the U.S. Weather Bureau, 1900. Has devoted much attention to the development of a system of wireless telegraphy known by his name, and has also carried out important experiments in wireless telephony. Contributor of articles on wireless telegraphy and telephony to many technical journals.

Field, Rear-Admiral F. L., C.B., C.M.G., 3rd Sea Lord and Controller of the Navy; Member of Committee (appointed November, 1919) to advise British Government on Imperial W/T Communications.—B. April 19th, 1871. Entered Royal Navy, July, 1884; promoted Lieut., 1893; qualified as Torpedo Lieut., 1896. Landed in expedition for Relief of Legations at Peking from H.M.S. "Barfleur," 1900. Mentioned in despatches; wounded at taking of Tientsin Native City. Promoted Commander, 1902; Captain, 1907; Commanded H.M.S. "Duncan," 1910; Superintendent of Signal Schools, 1912; Capt. H.M.S. "Vernon" (Torpedo School), 1914; Capt. H.M.S. "King George V" at Battle of Jutland; mentioned in despatches, awarded C.B. (Military division). Chief of Staff to Admiral Second-in-Command Grand Fleet, 1916. Awarded C.M.G. for this service. Director of Torpedoes and Mining at Admiralty, 1918. Promoted Rear-Admiral, February 11th, 1919. Appointed 3rd Sea Lord and Controller, April 15th, 1920. Address: Admiralty, Whitehall, London, S.W.1.

Fisk, Ernest Thomas, M.I.Radio E.—B. Sunbury-on-Thames, August 8th, 1886. Educ. Primary and High Schools. Studied physics, mathematics, and commercial subjects. After two years with Messrs. Frederick Walton and Co., he entered the British Telegraph Service. Joined the Marconi Company in England (1905). Temporarily engaged in engineering branch of the American Marconi Company, erecting stations on ship and shore. Undertook a special mission to the Arctic icefields, 1909, and demonstrated the possibilities of wireless communication with Newfoundland Sealing Fleet. Visited the Antipodes, 1910, in R.M.S. "Otranto," and demonstrated the use of the Marconi apparatus for the Orient Mail Line of steamers. Again visited Australia, 1911. General Manager with a seat on the board of directors of Amalgamated Wireless (Australasia), Limited, 1913. Revisited England, 1916. Shortly after return to Australia, accepted position as Managing Director of the Company. Tested possibility of direct wireless communication between England and Australia. Gave the first public demonstration of wireless telephony in Australia before the Royal Society of New South Wales. Reorganised manufacturing work. Managing Director of the Austral Electric Company. Founder

and initiator of "Sea, Land, and Air," the first journal in the Southern Hemisphere to deal with aviation and wireless. Established the Australasian branch of the Wireless Press. Member of the Electrical Association of Australia, President of the Wireless Institute of Australia (New South Wales Section), Member of the Sydney Chamber of Commerce and the Chamber of Manufacturers, Member of the Executive Committee, Australasian Industries Protection League, Member Provisional Committee appointed to consider the formation of the Chamber of Science and extending application of science to industry. Chairman Section of Industry, Royal Society of N.S.W., 1920-21.

Fleming, John Ambrose, D.Sc., M.A., F.R.S., University Professor of Electrical Engineering, University of London (1912).—B. Lancaster, November 29th, 1849. Educ. University College School, London; University College; R. School of Mines. Sometime Fellow of St. John's College, Cambridge; Fellow and Hughes Gold Medallist, Royal Society. Lecturer in mechanics and applied science, Cambridge University (1880). First Professor of Mathematics and Physics (1881), University College, Nottingham. First occupant of Pender Chair of Electrical Engineering, University College, London (1885); Vice-President of Wireless Society of London. Sometime Vice-President of Institution of Electrical Engineers and Physical Society. Honorary Member of the Royal Engineers' Institute, Chatham. Scientific Adviser to the Edison and Swan United Electric Light Company, 1882-93. Scientific Adviser to the London Electric Supply Corporation, and many other corporations, firms and companies in electrical matters. Publications: Numerous contributions to scientific literature and research. Author of well-known text-books, particularly on wireless telegraphy. Twice awarded Institution Premium of Institution of Electrical Engineers; also silver medal of Royal Society of Arts, and Bernay's Premium of the Society of Engineers. Widely known as inventor of the Thermionic Valve or Fleming Valve, the judicial decisions on which have declared it to be a pioneer invention of unusual utility, and one that has enormously aided the development of wireless telegraphy. Address: The Pender Electrical Laboratory, University College, Gower Street, London, W.C.1.

Forberg, Olaf E., Director of Telegraphs, Iceland.—B. November 22nd, 1871, in the Province of Finnmark, Norway. Early attached to the Norwegian Telegraphic Service, first as a Telegraphic Clerk, later as the head of a station; Manager of the Controlling Station, Veblungnes, in the Romsdal, 1900. Erected several new telegraphic plants in Norway, 1893-1904. Went to Iceland on an inspection, 1905, and in 1906 he constructed the telegraphic line from Reykjavik to Seydisfjord. Superintended the erection of stations and organisation of the telegraphic system in Iceland. Director of Telegraphs in Iceland, 1907, and controls both the wired and wireless nexus of the island. Member of the Engineers' Association of Iceland. Knight of Dannebrog, 1907. Address: Director of Telegraphs, Reykjavik, Iceland.

Fortescue, Cecil E., Professor of Physics, Royal Naval College, Greenwich, since January, 1911.—B. January 15th, 1881. Educ. Oundle School and Christ's College, Cambridge. First-class Honours, Mechanical Sciences Tripos, 1903. Engineering training with Messrs. Siemens Dynamo Co., Stafford, 1903-06. Civilian Instructor in Applied Mechanics and Electro-Technics at H.M. Gunnery and Torpedo Schools,

Portsmouth, October, 1906. During the war attached to Wireless Telegraphy Department, H.M.S. "Vernon," and at H.M. Signal School, Portsmouth. Member of Institution of Electrical Engineers, serving on Committee of Wireless Section of that Institution. Fellow of the Institute of Physics. Member of the Physical Society of London, serving on the Council. Member of Sub-Committee "D" on Thermionic Valves of Radio Research Board, of the Department of Scientific and Industrial Research. Address: Royal Naval College, Greenwich, S.E.10.

Franklin, Charles Samuel.—B. 1879. Received engineering and scientific training at Finsbury Technical College, under Professor Sylvanus Thompson. After some time spent in electrical work, first at Manchester and afterwards with the Norwich Electricity Company, joined Marconi's Wireless Telegraph Company (then known as the "Wireless Telegraph and Signal Company"), 1899, and still remains in their service. He has during recent years been engaged in conducting experimental and research work on behalf of Senatore Marconi, and has a number of important patents to his credit.

Frey, Emile, Director of the International Bureau of the Telegraph Union since 1897; Director of the International Bureau of the Radiotelegraphic Union since 1910. Swiss politician.—B. 1838, Alesheim. Visited United States, and took part in American Civil War, serving with the Northern (or Federal) Army. Returned to Switzerland, 1865. Member of the National Council, 1872, of which he was Chairman from 1875 to 1876. Swiss Minister Plenipotentiary at Washington, 1882-88. Member of the Federal Council, 1890, Vice-President, 1892. President of Swiss Confederation, 1893. Resigned from the Federal Council, 1897. Address: Bureau International de l'Union Télégraphique, Berne, Switzerland.

Frouin, M.—Director of French Telegraphs, one of his country's representatives at the International Radiotelegraphic Conference, London, 1912.

Gentil, Captain Antonio Alves Soares Branco, Member of Technical Committee of Portuguese Naval Wireless Telegraphy.—B. March 7th, 1874. Educ. at the Polytechnic and Naval Schools. Between 1893 and 1909 filled various Naval posts in Angola and Mozambique. Qualified as Torpedo Operating Officer at the Naval College of Val de Zebro in 1909, appointed Instructor of Wireless Telegraphy at the Naval College in 1910. Qualified as Submarine Commander in 1915. In 1916 became member of the Technical Committee of Naval Wireless Telegraphy appointed to investigate and make recommendations concerning wireless in all Portuguese Colonies. Address: Portuguese Admiralty, Lisbon.

Girardeau, Emile, Managing Director, Société Française Radio-Electrique and Cie Gle de Télégraphie sans Fil. Director of the Cie d'Exploitation Radio-Electrique.—B. 1882. Educ. Ecole Polytechnique. Joined the Army and served as an officer in the Engineers. Author of various works on a number of subjects relating to wireless telegraphy. Played an important part in the creation and organisation of the Société Française Radio-Electrique, of which he is the founder. He is a Member of Légion d'Honneur.

Glazebrook, Sir Richard Tedley, Kt., C.B., M.A., D.Sc., F.R.S.—B. Liverpool, Sept. 18th, 1851. Educ. Trinity College, Cambridge. Fifth Wrangler. Studied Physics as Graduate

at the Cavendish Laboratory, Cambridge, under Clerk Maxwell and Lord Rayleigh. Fellow of Trinity College, Cambridge (1877). Principal of University College, Liverpool (1898-99). First Director of the National Physical Laboratory (1899-1919). Chairman of the Aeronautical Research Committee. Zaharoff Professor of Aviation and Director of the School of Aeronautics, Imperial College. Past President of the Institute of Electrical Engineers. Medal of the Royal Society of Arts (1918). Member of Technical Committee inquiring into Imperial Wireless scheme. Publications: Numerous works on Physical Optics, Laws and Properties of Matter, text-books on Heat, Light, Mechanics and Electricity, as well as numerous papers in Scientific and Technical Journals. Address: Coton End, 63, Grange Road, Cambridge.

Gold, Lieut.-Col. E., D.S.O., F.R.S., Assistant Director of Meteorological Office.—B. Berkswell, Warwickshire, July, 1881. Educ. King Henry VIII's Grammar School, Coleshill; Sir Josiah Mason's College, Birmingham; St. John's College, Cambridge. (Third Wrangler, 1903.) Part II Natural Science Tripos, 1904. Lecturer in Mathematics, City of London College, Moorfields, 1904; Fellow St. John's College, Cambridge, 1906; Superintendent, Instruments Division, Meteorological Office, 1906; First Schuster Reader in Dynamical Meteorology (1907); Superintendent of Statistics, Meteorological Office (1910). Gazetted Capt., June, 1915, and attached G.H.Q. as Meteorologist to R.F.C. D.S.O. for services in Battle of Loos, and promoted Major. Appointed to command of new Meteorological Section, R.E. Mentioned in dispatches five times; promoted Lieut.-Col., March, 1918. Represented British meteorology in Aeronautical Convention at Peace Conference, 1919. Research: Identification of negative "ions" in flames with "electrons" (1905); relation between barometric pressure and wind velocity (1906); atmospheric radiation (1907). Publications: Report on existing state of knowledge of upper atmosphere (read British Association, 1919); "International Kite and Balloon Ascents" (1911), which gained German Meteorological Society's prize open to all the world. Address: 8, Hurst Close, Bigwood Road, Hampstead Garden Suburb, London, N.W.

Goldschmidt, Professor Dr. Rudolf.—B. March 19th, 1876, at Neu-Bukow, Mecklenburg, Germany. Educ. Wismar Municipal School. Studied engineering at Charlottenburg and Darmstadt Technical High School. Engineer in the laboratory of the A.E.G. in Berlin, 1900. Chief laboratory engineer and designer in Prague, 1901-02. Chief engineer and designer at Cromptons and Co., Ltd., Chelmsford, 1902-05; similar position with Brit. Westinghouse El. and Man. Co., Manchester, 1905-07. Lecturer at Darmstadt Technical College, 1907. Here he practised as a consulting engineer, and also pursued the development of several inventions, chiefly occupying himself with the invention and design of high-frequency alternators for wireless telegraphy. Established (1911) two large wireless stations at Elville, Province of Hanover, and Tuckerton, New Jersey, U.S.A., for wireless communication between Germany and America. Address: Berlin-Westend, 45, Lindenallee.

Goldsmith, Prof. Alfred N., B.Sc., Ph.D.—B. New York City. Graduated from the College of the City of New York and Columbia University. Author of "Elements of Physics," "The Transmission of Canal Rays through Thin Partitions," "Radio Engineering at the College

of the City of New York," "The Engineering Measurements of Radiotelegraphy," "Radiotelephony," and other works. Research worker in radio communication, and particularly in radiotelephony. Director of Radio Engineering Laboratory at the College of the City of New York. Editor of the "Proceedings of the Institute of Radio Engineers," Chairman of the Standardisation Committee of the Institute of Radio Engineers (1915), Secretary of the Institute (1918-20), and Member of Board of Direction of the Institute. Fellow of the Institute of Radio Engineers, Fellow of the American Institute of Electrical Engineers, Member of the American Physical Society. During 1917-18 Technical Director of the U.S. Signal Corps School of Radio and Multiplex Telegraphy, New York, besides being associated with the U.S. Naval Radio Compass School. Director of the Research Department of the Radio Corporation of America, and for the Pan-American Wireless Telegraph and Telephone Co. Address: The College of the City of New York.

Gottwaldt, Commander B. L., late Inspector of W/T, Norwegian Navy Department. Technical Manager, Norwegian Wireless Company (Norsk Marconikompani).—B. Christiania, 1880, entered Naval Academy, Norwegian Navy, 1898. Graduated sub-lieutenant, 1901. Attended the Military Academy of the Royal Navy, 1901-04, afterwards the Technical College, Charlottenburg, Berlin. At the latter studied electrical engineering, telegraphy, telephony, and wireless telegraphy. Visited (1906) England on behalf of the Norwegian Admiralty to attend to some special work with Messrs. Armstrong, Whitworth Co., Newcastle-on-Tyne. Returned to Norway and placed in charge of W/T in the Royal Norwegian Navy, where he was responsible for the erection of naval, land and ship stations. Appointed Commander, 1912. Entrusted with the control and test of wireless apparatus ordered in England and Germany by the Norwegian Government. One of the Norwegian delegates at the International Radio Conference in London, 1912. He has written a number of articles, and three books on wireless. Address: 15, Baldersgate, Kristiania.

Gray, Andrew, A.G.T.C., Assoc. M.Inst.C.E., M.I.E.E., Chief Engineer of the Marconi Parent Company (since 1910).—B. Glasgow, 1873. Educ. Glasgow University; Royal Technical College. Diploma of latter in electrical engineering. Served as assistant to late Professor Andrew Jamieson, of Royal Technical College. Joined the West India and Panama Telegraph Company, Ltd. (1893), serving respectively as assistant electrician, chief electrician, and telegraph engineer. Entered Marconi Company, 1899. Introduced Marconi system to Hawaiian Islands. Organised telegraph working and trained native operators of Inter-island Telegraph Company of Honolulu. Appointed Chief of Staff to the Marconi Companies, and in that capacity organised the working of the ship and shore wireless service, designed the original 1½ kw. Ship Set, and supervised the ship and shore operating until 1906, when the engineering and traffic work were separated. Address: 78, Cressfield Road, Acton, W.3.

Grenfell, Wing Commander George Pascoe, D.S.O. (1917).—B. 1883. Educ. privately. Successively on staffs of Eastern Telegraph Co., Ltd.; Amalgamated Radio Telegraph Co., Ltd. (De Forest & Poulsen Systems); British Radio Telegraph Co., Ltd. Went overseas 1915 in charge of Wireless in R.F.C., Middle East. Served in Egypt, Senussi campaign, and Salonika.

Transferred to H.Q. Staff—R.F.C., B.E.F., France, end of 1916. In charge of W/T (Communications and Artillery Co-operation). Mentioned in dispatches, 1917. Returned to England and joined Staff of Director of Air Organisation, Air Ministry, as S.O. 1, June, 1918. Appointed member of W/T Board, June, 1918. Took command of W/T Experimental Establishment, Begg n Hall, December, 1918. Address: R.A.F., Begg n Hall, Kent.

Hammond, John Hays, Jr.—B. San Francisco, April 13th, 1888. Educ. Preparatory Schools in England and the U.S. Graduated from the Yale-Sheffield Scientific School, 1910. Working ever since on the development of the system of radio control of torpedoes and other moving bodies. Originator of the system of aerocoastal patrol, comprising aeroplanes equipped with wireless, which received the endorsement of President Wilson, the Secretary of Navy, and the Secretary of War. Author of a four-volume treatise on the Art of Teledynamics. Treasurer of the Institute of Radio Engineers, and Manager and Chairman of the Committee on Admissions. Associate Member of the American Society of Mechanical Engineers. Delegate to the London International Radio Telegraphic Conference, 1912. Member of the American Institute of Electrical Engineers. Received honorary degree of Doctor of Science at George Washington University, June, 1910. Invented system of aerial radio surveying and mapping, which has been adopted by the Bartlett Expedition for Polar Basin surveying. Inventor of thermite incendiary shell, testing by Bureau of Ordnance, War Department. Inventor of the Radio-dynamic Torpedo, testing by U.S. War Department. Address: Hammond Radio Research Laboratory, Gloucester, Mass.

Harrison, Lieut.-Col. Norman, C.M.G., D.S.O., M.I.E.E.—B. 1873. Educ. in Natal. Served in South African War, and European War, 1914-19, as Director of Army Signals in German South-West Africa, and as Assistant Director of Army Signals, and Commanding South African Signal Units (attached to Corps of Royal Engineers) in France, 1916-19. Engineer-in-Chief of Posts and Telegraphs, Union of South Africa since 1910. Addresses: (1) G.P.O., Pretoria; (2) Pretoria Club, Pretoria; (3) Civil Service Club, Capetown.

Hayashi, Professor Fusakichi, Ph.D., Professor at the Kyushu Imperial University, June, 1919.—B. Tokushima prefecture, 1879. Graduated from the Science College of the Tokyo Imperial University, July, 1903. Studied at the University Hall, and at Göttingen University, 1900-12, and Jena University, 1912-13. After engagement from the Governors of Kiangsu and Shansi provinces as instructor at normal schools for several years, served in the Navy Dept. and engaged in studies on radiotelegraphy, January, 1914. Promoted Naval Engineer, June, 1914.

Hogan, John V. L.—B. Philadelphia, Pa., U.S.A. Educ. Scientific School of Yale University, specialising in physics and mathematics. Assisted Dr. Lee De Forest in his work on experimental Radiotelephony, and in the development of the grid audion, 1906 and 1907. Joined the staff of the National Electric Signalling Company at Brant Rock, Mass., 1909. Appointed Chief Research Engineer of that Company, 1914. In 1917 the Company changed its name to the "International Radio Telegraph Co.," and in 1918 he was appointed manager. Author of "The Heterodyne Receiving System," "Wireless Telegraphy in Railroad Service," "Transatlantic Radiotelegraphy," and numerous other

articles and papers published in the Proceedings of the Institute of Radio Engineers, the "Electrician" (London), the "Electrical World," the "Jahrbuch der D.T.U.T.," etc. Fellow of the Institute of Radio Engineers, and Vice-President since 1916. Member of the American Association for the Advancement of Science, of the American Institute of Electrical Engineers, and honorary member of the Radio Club of America. Chairman of the Standardisation Committee of the Institute of Radio Engineers since 1916. He is the holder of a number of patents embodying inventions relating to radiotelegraphy, and has been identified with important patent litigation as principal technical witness. Address: C o International Radio Telegraph Co., 326, Broadway, New York, U.S.A.

Holmstrom, J. Gunnar, Director of Radio-telegraphic Instruction, Stockholm, Kt. of "Vasa" Order.—B. Stockholm, April 23rd, 1874. Passed through Poly. Acad., Stockholm, 1896. Assistant Royal Swedish Telegraph Dept., 1892. Teacher at Swedish Artillery and Engineers' College, 1901, and College for Naval Officers, 1908. Head of the Telegraph Department's School, 1902. Publications: "Lärobok in Telegraf," 1911, and "Handbok i Radiotelegraf," Stockholm, 1908. Address: Malmkillnadsgatan 19 B, Stockholm.

Hooper, Commander Stanford C., United States Navy.—In charge of Radio material, construction, supply and development in the Bureau of Engineering attached to the U.S. Navy. B. August 16th, 1884, Colton, Cal. Educ. at San Bernardino, California. Started his career as telegraph operator in the Southern Pacific Company, afterwards transferring to the Postal Telegraph Company. Entered the Naval Academy, Annapolis, Md., September 6th, 1901. Graduated January 31st, 1905. Served as midshipman on the cruiser "Chicago," destroyer "Perry," and monitor "Wyoming," and later on various ships as ensign, 1907, lieutenant, 1910, lieutenant-commander, 1915, commander, 1918. Instructor of electrical engineering, physics, and chemistry at the U.S. Naval Academy, 1910-11. Fleet Radio Officer of the United States Atlantic Fleet, 1912-13, taking part in the capture of Vera Cruz, Mexico. Early in the war acted as observer in Europe. In charge of the Radio Division Bureau of Steam Engineering, Navy Department, 1915-17. Commanded the destroyer "Fairfax" in the Atlantic during 1917-18, then returned to take up duties in the Navy Department, 1918. Address: Navy Dept., Washington, U.S.A.

Hope-Jones, Frank, Chairman, Wireless Society of London.—B. 1867. From 1890 to 1895 associated with his elder brother, Robert Hope-Jones, in some of his earliest applications of electricity to organ-building. Has established the business of electric time service on a scientific basis. Member of the Institution of Electrical Engineers and the British Horological Institution. Author of numerous contributions to technical journals and to the Proceedings of Scientific Societies. Address: 32 and 31, Clerkenwell Road, E.C.1.

Howe, Prof. George William Osborn, D.Sc., M.I.E.E.—B. 1875, Charlton, Kent. Educ. the Roan School, Greenwich, Woolwich Polytechnic, Durham University. Nine years with Siemens Bros., at Woolwich, and Siemens and Halske, at Charlottenburg. Two years lecturer at Hull Technical School. Lecturer and later Assistant Professor of Electrical Engineering at the City and Guilds Engineering College, which forms the engineering section of the Imperial College of Science and Technology at

South Kensington. D.Sc. of Durham, hon. D.Sc. of Adelaide University. Whitworth Scholar. Has read several papers on Radiotelegraphy before the Royal Society, the British Association, the Physical Society, etc. Awarded the silver medal by the Royal Society of Arts (1912) for his paper on "Some Recent Developments in Wireless Telegraphy." Fellow of the Physical Society. Member of the Radiotelegraphic Research Committee of the British Association and of the Wireless Sectional Committee of the Institution of Electrical Engineers. Accepted an important appointment at National Physical Laboratory, 1921. Editor, "Radio Review." Address: City and Guilds Engineering College, South Kensington, London, S.W.

Hoyle, Lieut. Bertram, M.Sc., A.M.I.E.E., Assistant Lecturer, Victoria University and College of Technology, Manchester.—B. Oldham. Educ. College of Technology, Manchester (of which he is now an Associate), and at the Victoria University, Manchester. In 1907 he obtained the Certificate and Diploma in Technology and M.Sc. (Tech.) of Victoria University. Served with Messrs. Henry Simon, Ltd., Manchester, and with Messrs. S. Z. de Ferranti, Ltd., Hollinwood. Assistant Lecturer and Demonstrator in Electrical Engineering at the College of Technology, Manchester, 1911. Had charge of the design and erection of the wireless station with which the School of Technology is equipped. Enlisted early in 1915 as a motor cycle despatch rider, and served on the Western Front. In September, 1915, gazetted Lieut. R.N.V.R. Author of "Standard Tables and Equations," and a number of technical essays and monographs. Address: 18, King's Drive, Heaton Moor, near Stockport.

Illingworth, Albert Holden, P.C., M.P., British Postmaster-General since Dec., 1916. (L.) Heywood Div. S.E. Lancs, 1915 to 1918. Heywood and Radcliffe since 1918.—B. 1865. As Postmaster-General is in supreme direction of Civil Wireless Telegraphy as far as United Kingdom is concerned. Address: Denton Park, Ben Rhydding, Yorks; 60, Eaton Place, S.W.1.

Isaacs, Godfrey C.—Educ. England, France, and Germany. Began life in his father's business, and a few years later was manager. Managing Director of Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Communication Co., Ltd., 1910. Addresses: Lyne Grove, Virginia Water, Surrey, and 31, Wellington Court, Knightsbridge, S.W.1.

Jackson, Admiral of the Fleet Sir Henry Bradwardine, G.C.B., K.C.V.O., D.Sc., LL.D., F.R.S., M.I.E.E.—B. Barnsley, January 21st, 1855. Entered Royal Navy December, 1868. Capt. 1896; Rear Admiral 1906; Controller of Navy 1905-08; Commanded 6th Cruiser Squadron 1908-10; Chief of Naval War Staff 1912-14; First Sea Lord May, 1915-December, 1916; President R.N. College, Greenwich, 1917-19. Hon. Vice-President of Inst. of Naval Architects. Vice-President of Wireless Society of London. Chairman of Radio Research Board 1920. Hon. D.Sc. Leeds and LL.D. Cantab. Whilst Commander of H.M.S. "Edinburgh," in 1893, conceived the idea of using Hertzian Waves for Naval signalling purposes, especially in connection with Torpedo Boat Work, experimented intermittently in this direction by exciting a circuit which included a filings coherer tapped by the hammer of a high-resistance trembling bell. Continued to take much interest in the development of W.T., and assisted in its organisation in the Navy. Address: 37, Catherine Street, London, S.W.1.

Janet, Paul.—Professor of Physics, University of Paris, Director of the Central Laboratory and of the High School of Electricity. B. January 10th, 1863, in Paris. Studied at the Lycée Louis-le-Grand and the High School. Member of the French Society of Physics, the International Society of Electricians, and the Society of Civil Engineers of France. Professor of Physics at the University of Grenoble, 1886-94. Author of several important works. First to make a successful experiment in electric resonance by means of high-frequency currents, 1892; this is the phenomenon used to-day in wavemeters.

Jenner, Axel.—B. 1885. Student 1904. Assistant at the Swedish Telegraph Service 1905. Passed the course for superintendents of the wireless stations 1916. Since 1916 superintendent of the wireless station at Boden, Sweden. Address: Boden, Sweden.

Jotikassatra Hang, Chief of the Wireless Department of the Naval General Staff, Siam.—B. at Bangkok, September 27th, 1876. Educ. at Bangkok and at Penang. In 1890 he was sent to Europe to be educated as an engineer. He studied seven years at Erfurt, and entered in the Technische Hochschule at Hanover in 1897. On passing the final examination of that school in 1902, he returned to Siam and joined the Siamese Navy as an Engineer-Lieutenant. 1907-12, an instructor in the Naval Cadet School. Awarded the title of Luang Nava Vichitr, 1911. Joined the Naval General Staff as the Chief of the Wireless Department, 1912. Promoted Commander 1918. Awarded the title of Phra Vidyu Duralikhrit 1920. Address: Bangkok.

Kadōka, Hayao.—B. Tokyo, March, 1883. Graduated from the Tokyo Imperial University, July, 1906. Studied at the Earthquake Prevention Investigation Commission in the Dept. of Education, November, 1908. Lecturer at the Science College of the Tokyo Imperial University, March, 1909. Served in the Army, for researches on radiotelegraphy. Proceeded to Europe and America for inspection of the war-time condition of radiotelegraphy, 1917-1918. Since 1911 designed several radio stations.

Kajima, Akira.—B. Tokyo, 1883. Graduated from the Greek Catholic Mission School, Tokyo, 1904, and became publisher of a religious magazine. Interpreter at the French Embassy from 1905 to 1906. Received a medal in recognition of distinguished services. Joined the editorial staff of the *Chuo Shimbun* in 1906 and that of the *Kokumin Shimbun* in 1908. Established the Japanese Wireless Press in 1911 and the Nippon Radio Apparatus Manufacturing Company, 1915. Started a monthly magazine named *Musen no Nippon* or Wireless Press, in 1918. Managing Director, Nippon Radio Telegraph and Telephone Co., Ltd. Office address: 1280 Shimo Shibuya, suburb of Tokyo. Private residence: 46, Kobinata-Daimachi 1-chome, Koishikawa, Tokyo.

Kennedy, Sir A. B. W., F.R.S.—B. London, March 17th, 1847. He has had great mechanical engineering experience. Some time President of the Institution of Civil Engineers, and the Institution of Mechanical Engineers. Professor of Engineering at University College, London, 1874-89, and founded there the first "Engineering Laboratory." Designed electric lighting and power stations for many companies and corporations, and has also been engaged in railway and constructive work. Knighted 1905 for his services to the Admiralty. Member of the

Technical Committee appointed by the Postmaster-General to consider the Imperial Wireless Scheme. Civilian Member of the Ordnance Committee. During the War was Member of the Munitions Inventions Panel, and Vice-chairman of the Anti-Aircraft Equipment Committee (Ministry of Munitions). Consulting Electrical Engineer to the L.N.W.R., L.S.W.R., and the London County Council. Chairman of the Electn. of Railways Advisory Committee (Ministry of Transport). Address: A7, The Albany, Piccadilly.

Kennelly, A. E.—B. Calaba, Bombay, December 17th, 1861. Educ. in England, Scotland, Belgium, France and Italy. Past-President of the American Institute of Electrical Engineers, Past-President of the American Association of Illuminating Engineers; President, in 1916, of the Institute of Radio Engineers; Vice-President of the International Electrical Congresses, Paris and Turin; General Secretary of the Congress at St. Louis, Mo., U.S.A. Left school in 1875 to become a telegraph operator in the Eastern Telegraph Company. Chief Electrician on Cable Ship 1881; Senior Electrician ship staff, E.T.C., 1886. Principal electrical assistant to Thomas A. Edison, in the laboratories at Orange, N.J., 1886-92. Consulting Engineer in Philadelphia. In partnership with E. J. Houston, of the Thomson-Houston Company, 1893-1900. Engineer-in-Chief when the cables were laid from Vera Cruz to Campeche, 1902. Professor of Electrical Engineering at Harvard University and also at Massachusetts Institute of Technology, since 1914. Corresponding Fellow of the British Association for the Advancement of Science; Honorary Member of the Institution of Electrical Engineers of London, and has twice received one of its premiums for papers. Director of Research Division of the Electrical Engineering Department, Massachusetts Institute of Technology, and Fellow of the American Academy of Arts and Sciences. He has written twenty-three books as author or collaborator, one of which is considered a standard elementary exposition of wireless telegraphy, and is author of more than 120 scientific papers. Honorary degrees include the S.D. of University of Pittsburg and A.M. degree of Harvard University. Some time Chairman and Secretary of Standards Committee, American Institute of Electrical Engineers, President and Secretary of the American Committee of the International Electro-Technical Commission. Has specialised in alternating currents. Address: Harvard University, Cambridge, Mass., U.S.A.

Kitt, A. A.—B. London, 1881. Educ. City of London School and Finsbury Technical College. Joined Marconi Company, 1902. Acted as erecting engineer supervising the installation of many of the earlier ship stations, including those on board the first vessels of the White Star fleet to be equipped. In charge of the installation of the Post Office Wireless Stations at Lochboisdale, Tobermory and Bolt Head. Appointed Chief of the Estimating Department of Marconi's Wireless Telegraph Company, 1911.

Kimura, Shunkichi, Ph.D.—B. 1866. Graduated Scientific College of the Tokyo Imperial University, in the department of Physics, 1888. Lecturer of the First High School in Tokyo. Studied Mathematical Physics in Harvard and Yale Universities, 1893-95. Received the degree of Ph.D. (Yale), 1895. Member of Sigma Xi Society. Visited Holland. Co-founder with Dr. Molenbroek, assisted by Professor Tait, of Edinburgh, and Dr. Joly, of Dublin, of the Association for Promoting the Study of Quaternions and

Allied Subjects. Returned to Japan. Professor of the Second High School in Sendai. Transferred to the Imperial Japanese Navy, 1901, to investigate wireless telegraphy for naval use. Invested with Order of Rising Sun (5th Class), 1903. Invested with Order of Rising Sun (3rd Class) with annuity, 1906. Fellow of the Royal Society of Arts, 1906. Japanese delegate to the International Wireless Telegraph Conference, Berlin, 1906. Retired from the Navy, 1912. Patent Attorney, with office at the Mitsui Building, Honkawayacho, Nihonbashi, Tokyo. Director of various companies, including the Nippon Radio Telegraph and Telephone Company. Engaged in the successful litigation for the General Electric Company against some Japanese firms on the infringement of the patents with respect to the ductile tungsten. Author of several papers on wireless telegraphy. Address: Momosono, Nakano, Tokyo.

King, Professor Louis V.—B. Toronto, Ontario, 1886. Educ. Montreal High School. Gained the degree of B.A. at McGill University with first-class honours and gold medal in mathematics and physics, 1905. Scholar of Christ College, Cambridge, 1906. Graduated at the same University with first-class honours in mathematical tripos. Lecturer in Physics at McGill University, 1910; Assistant Professor of Physics, 1912. Awarded the D.Sc. degree of the McGill University, 1915. Fellow of the Royal Society, Canada. Macdonald Professor of Physics. Investigated submarine acoustics for the Electrical and Submarine Committee of the British Board of Inventions, 1915. Awarded Howard N. Potts Gold Medal of the Franklin Institute for researches in hot-wire anemometry, 1918. Engaged for some time in important researches on the efficiency of fog signal machinery and the measurement and distribution of sound. President of Section III (Mathematics, Physics and Chemistry) of the Royal Society of Canada, May, 1919. Appointed to the Macdonald Chair of Physics, 1920. Address: McGill University, Montreal, Quebec, Canada.

Kojima, Chief Engineer Kiyoshi.—B. Tokyo, January, 1889. Graduated from the Science College of the Kyushu Imperial University, July, 1915. Entered the service of the Department of Communications and engaged in scientific researches at the Electrical Laboratory under Dr. Wichi Torikata. Joined Nippon Radio Apparatus Manufacturing Company as chief of Engineering Department, April, 1916.

Kolster, Frederick A.—B. Geneva, Switzerland, January 13th, 1883. Educ. Public Schools of Cambridge, Mass., and at Harvard University. Assistant to John Stone Stone 1902-08. Took an active part in wireless engineering up to 1912. Joined the scientific staff of the U.S. Bureau of Standards, 1912, and has since been closely associated with the radio work of the U.S. Government. Inventor of a direct reading decimeter and other devices, Fellow of the Institute of Radio Engineers. Attaché to American delegation representing the U.S. in London International Radio Convention in 1912. Member American Institute of Electrical Engineers. Member Cosmos Club, Washington, D.C. Address: U.S. Bureau of Standards, Washington, D.C.

Koomans, Nicolaas.—B. December 18th, 1879, at Delft. Studied at Delft for mechanical and electro-technical engineer, obtaining his certificate, 1901. For one year assistant in applied geometry, and for one and a half years in physics and electrical engineering at the Technical High School at Delft. Entered the Government Telegraph Service. Grad. 1908 at Technical

High School at Delft as Doctor in Technical Sciences on the strength of a dissertation "Regarding the Influence of Self-Induction in Telephone Conducting Wires," containing theses in which are laid down the results of, and the conclusions from, experiments and measurements on Pupin cables of the Dutch telegraph administration. Joint-founder and editor of the *Monthly Review for Telephony and Telegraphy*. Joint-founder and member of the managing board of the Dutch Society for Radiotelegraphy (Nederlandsche Vereeniging voor Radiotelegrafie). Member of the International Electro-technical Commission. Professor in Physics and Theoretical Electrical Engineering at the school of the Dutch Post and Telegraph Administration. Supervises the instruction of all the higher officials. Address: Antonie Duyckstraat 24, The Hague, Holland.

Korn, Professor Arthur.—Professor at Polytechnical High School, Berlin-Charlottenburg. B. Preslau, Germany, May 20th, 1870. Studied at Liepsic and Paris in Mathematics and Physics. Professor of Physics, University of Munich, 1903-08. Best known as the inventor of a system of telegraphic transmission of photographs, and in 1907 the first photograph was transmitted under his system from Munich to Berlin, a distance of 600 kilometres. Inventor of a system of teleradiography and wireless phototelegraphy. Author of "Elektrische Fernphotographie und Aehnliches," Leipzig, 1904, and "Handbuch der Phototelegraphie und Teleradiographie" published in 1911 in collaboration with Dr. Glatzel. Address: Charlottenburg, Berlin Schlüterstrasse 25.

Koto, Major-General, Teizo, Military Engineer.—B. Yamaguchi prefecture, May, 1873. Entered the military service as cadet in the 6th Engineering Battalion, 1892, and promoted to 1st Lieutenant, May, 1898. Entered the Science College of the Tokyo Imperial University as a special student of the School of Artillery and Engineering, 1900, and graduated therefrom 1903. Served in the Russo-Japanese war as the chief of the Field Telegraph Corps, 1904. Promoted Major and appointed an inspector of the Military Technical Dept., 1905. Promoted Lieut.-Major and appointed member of the Military Wireless Investigation Committee, 1910. Proceeded to China for the erection of a radio station on Chinwangtao Island, 1912. Promoted Colonel and Chief of the Communications Dept. of the Tsingtau Garrison, 1915. Engaged in the erection of radio stations at Hankow and Tsinan. Promoted Major-General and Military Engineer, 1919.

Krupp, J. F., Chief of Department, Knight of Dannebrog.—B. Copenhagen, August 16th, 1868. Student 1885. Young lawyer 1891. Head clerk to Criminal Judge at Frederiksberg, 1891. Assistant in the Ministry of Home Affairs, 1894. Assistant to Copenhagen Harbour Administration, 1896-1907. Head clerk to Ministry of Public Works, 1904; Chief from 1912. Vice-President of the Electricity Commission, 1907; Chairman from 1916. Chairman of the Cement Commission, 1917. Member and Secretary of the Telephone Commission of 1917, from 1917; Chairman from 1920. Chairman of the "Gudenaa" Commission and the other Commissions concerning water power plants 1918, and of the Commission regarding Long Distance Radio Telegraph Stations. Address: Frederiksberg Allé 55, Copenhagen V, Denmark.

Kroger, F. H.,—Educ. University of Colorado. Graduated M.S. 1905. Apprenticed to the

Westinghouse Electric and Manufacturing Co., East Pittsburg, 1905. Engineer at Brant Rock Transatlantic station of the National Electric Signalling Co., 1906. Radiotelegraph Adviser to the States Signal Corps (1907), which installed the Inland Radio Station in Alaska. Organised educational courses in electrical engineering and in radiotelegraphy at Cornell University, 1908-11. Joined the International Radiotelegraph Company, New York, 1911. Joined the Marconi Wireless Telegraph Company of America (1919) as division engineer at their factory. Joined staff Radio Corporation of America, 1920. Address: 54, Martense Street, Brooklyn, New York.

Kujirai, Tsunetaro, Professor of the Tokyo Imperial University.—B. 1882. Graduated Electrical College of Tokyo Imperial University, 1907. Some time Wireless Engineer in the Department of Communications, and Assistant Professor of the Tokyo Imperial University. Awarded the Academy prize and medal of the Japanese Imperial Academy. Member of the Institute of Physical and Chemical Research. Address: Tokyo Imperial University, Hongo, Tokyo, Japan.

Langmuir, Dr. Irving, M.A., Ph.D. of University of Gottingen (1906).—B. Brooklyn, New York, January 31st, 1881. Educ. School of Mines, Columbia University; Graduated 1903 as metallurgical engineer. Undertook post graduate work at University of Gottingen under Professor Nernst. Returned to America and became Instructor in Chemistry at the Stevens Institute of Technology, 1906-09. Entered Research Laboratory of G.E.C. at Schenectady, 1909, where his investigations have included Radio Telephone and Telegraphic Apparatus, Tungsten Lamps, Electric Heating Devices, Pure Electron Discharge Apparatus, etc. During the war engaged on submarine problem and developed several successful detecting devices used by the United States Navy. Has been a frequent contributor to various scientific journals and published many scientific works. Addresses: G.E.C. Research Laboratory, Schenectady, New York. 6, Stratford Road, Schenectady, New York.

Latour, Marius.—B. October, 1875, in South-western District of France. Educ. University of Paris and Parisian Ecole Supérieure d'Electricité. For many years consulting Engineer to the General Electric Company of America. Author of numerous inventions in the world of electro-dynamics. Paid special attention to the construction of high-frequency machines, which he originally attempted to design in the shape of monophase or polyphase machines grouped in cascade. Analysed the essential features of machines based on this principle, and showed their analogy and close relationship to those of Professor Goldschmidt. Presented an original paper to the Technical Manager of the General Electric Company at Schenectady, 1904, setting forth the principle of the reception of continuous waves by beats, and this principle of beat reception is to-day in general use. Has specialised in the direction of constructing amplifiers of low and high frequency for wireless-telegraphic reception, for the benefit of the French Société Radio-Electrique, of which he is consulting engineer. Address: 8, Square Desaix, Paris, XVe. Telephone: Saxe 45-83.

Lippmann, Gabriel.—Of the Académie des Sciences at the Bureau des Longitudes. Commander of the Legion of Honour. Director of Laboratory of the Ecole des Hautes-Etudes. Professor at the Sorbonne. President

of the Interministerial Commission on Wireless Telegraphy. Occupied primarily with electrical matters. Inventor of an apparatus employed in Military Wireless Telegraphy for receiving Wireless Time Signals. Foreign Member of the Royal Society of London. Address: Sous-Secrétariat d'Etat des Postes et Télégraphes, Paris.

Litström, Axel Sigurd.—B. Falun, Dalecarlia, September 3rd, 1851. Passed Maturity Examination 1900. Examination of Electro-Technical Branch, Technical University, Stockholm, 1905. Entered the Telegraph Service, 1900. Inspector of wireless installations, 1913. First Engineer at the Radio Division of the Royal Telegraph Administration, Stockholm, 1920.

Ljungqvist, Seth.—B. Falun, Dalecarlia, Sweden, May 5th, 1880. Passed Maturity Examination, 1899, and Examination of Electro-Technical Branch, Technical University, Stockholm, 1901. Entered the Telegraph Service, 1899. Chief of the Radio Division in the Royal Swedish Telegraph Department, Stockholm, 1916. Address: Vonadisvagon 23, Stockholm.

Lodge, Sir Oliver, D.Sc., F.R.S.—B. Penkhall, Staffs, June 12th, 1851. Educ. at Newport (Salop) Grammar School; studied privately for several years. Entered University College, London, 1873. Graduated D.Sc. 1878. Reader in natural philosophy at Bedford College for Women and Assistant Professor of Physics in University College, London, for several years, Liverpool, for nineteen years. The First Principal of Birmingham University, 1900. Knighted, 1902. Original investigations on lightning, the seat of the electromotive force in the voltaic cell, the phenomena of electrolysis and the speed of the ion, the motion of the ether near the earth, and electromagnetic waves and wireless telegraphy. His patent (1897) for syntonic wireless telegraphy was extended for seven years by Lord Parker, and was acquired by the Marconi Co. in 1911. Has held the position of President of the British Association, President of the Physical Society, and of the Society for Psychical Research. Has made many important contributions to the literature of science. Address: Mariemont, Edgbaston, Birmingham.

Lombardi, Dr. Luigi, Professor of Electricity, Royal Polytechnic School, Naples, since 1901.—B. August 21st, 1867, Dronero (Italy). Diploma of Civil Engineering, Royal Engineering School, Turin, 1894; Diploma in Electricity and Gori-Feroni prize, Industrial Museum, Turin, 1891; Professor of Electricity, Zurich Polytechnic School (1891-96), at Industrial Museum, Turin (1897-1900). Publications: The "Scientific Principles of Electricity" and a text-book on Electrotechnics, besides numerous papers on kindred subjects. Author of a study on employment of condensers for transmission of electricity, which obtained Kramer Prize of Lombard Institute. Inventor of a special high tension electrical condenser. Now engaged in research upon electric surges and protective devices. For this purpose the first artificial line for very high tension has been erected in his laboratory. Delegate of the Italian Government at the St. Louis International Congress of Electricity; President of the International Electrotechnical Commission held in Turin in 1911. Address: Via Santa Lucia 173, Naples.

Loring, Commander F. G., R.N., M.I.E.E.—Inspector of Wireless Telegraphy, General Post Office. Entered the Navy in 1882 (retired 1910). Lieutenant on H.M.S. "Victoria" when that vessel was rammed and sunk by H.M.S. "Camperdown" off Tripoli (1893). Received Bronze

Medal of Royal Humane Society for saving two lives. In charge of Admiralty shore wireless stations 1902-08. Admiralty delegate at Berlin International Conference on Wireless Telegraphy, 1906. Appointed Inspector of Wireless Telegraphy, 1908. Post Office delegate at International Conference on Wireless Telegraphy, London, 1912. Technical Adviser to the Board of Trade on Wireless matters at International Conference on Safety of Life at Sea, London, 1914. Address: The Old House, Foot's Cray, Kent.

Lyons, Colonel Henry George, D.Sc., F.R.S.—B. October 11th, 1864. Educ. Wellington College, Director-General of the Survey Department in Egypt 1898-1909, gaining Victoria Research Medal, R. Geog. Soc., 1911. Member of the Meteorological Committee, 1913. European War, Commandant Army Meteorological Services; Acting Director Meteorological Office, 1918-19. Chairman of Sub-Committee "B" on Atmospheres of Radio Research Board of the Department of Scientific and Industrial Research. Keeper, Science Museum, 3, Cambridge Square, W.2.

Machado, Alvaro de Melo, Commander in Portuguese Navy, and Torpedo Operating Officer of the Naval College of Val de Zebro.—B. February 22nd, 1883. Entered Portuguese Naval Service, 1904, and elected Member of the Portuguese Academy of Science for his original design of wireless-controlled torpedo in 1907. In 1915, whilst only Second Lieutenant, became Manager of the Electrical Services of the Marine Arsenal, and was responsible for the direction of the installations made in the National Naval Units and Land Stations of the Navy. Reorganised the dismantled wireless on German vessels confiscated during the war. Received Portuguese Distinguished Service Medal, and made Member of the "Académie Française" in 1917, in acknowledgment of his wireless work. Address: Ministry of Commerce, Lisbon.

Makower, A. J., M.I.E.E.—B. May 9th, 1876. Educ. University College School, Gower Street, and at the College itself, between 1884 and 1895. Studied mathematics at Trinity College, Cambridge, taking his degree, 1898. Proceeded to Technical School, Charlottenburg, Germany, and obtained valuable insight into German methods. Joined the British Thomson-Houston Company, Rugby. Received an appointment at the South-Western Polytechnic, Chelsea, 1904. As head of the Electrical Engineering Department at the Polytechnic, was closely connected with the University of London, of which he was a teacher. At one time Secretary of the Board of Studies in Electrical Engineering, and Chairman of the Board of Examiners in Electrical Engineering. Author of many valuable papers on wireless subjects. Resigned his teaching post and became managing director of Mossay & Co., Ltd., designers and selling agents for commercial electric vehicles, 1918. A member of the Electric Vehicle Committee of Great Britain. Address: 12, Greencroft Gardens, N.W.6.

Makower, Capt. W., M.A., D.Sc.—B. December 6th, 1879. Educ. University College School and University College, London. Took honours degree in Chemistry at the University of London, 1900. His early research work relates to investigations in heat, but on proceeding to Trinity College, Cambridge, 1902, commenced investigations at the Cavendish Laboratory on radioactivity. Elected to a Research Fellowship in the University of Manchester. Subsequently Assistant Director of the Physical Laboratories. Continued these researches until 1917. Joined

the R.N.V.R. as a lieutenant, 1917, and subsequently became captain in the R.A.F. During the war, at the Air Ministry Laboratory in the Imperial College of Science and Technology, working on thermionic valves and other matters connected with wireless telegraphy. Since the Armistice has been engaged on various problems connected with wireless telegraphy and navigation being investigated at the Air Ministry Laboratory. Most of his scientific publications have been in connection with radio-activity, of which, perhaps, the most important are on the subject of radio-active recoil, which he discovered with Dr. S. Russ in 1909, and he was awarded the degree of D.Sc. at London as a result of his early investigations in this subject. Of his other contributions to Science are his work on the Electric State of the Upper Atmosphere and his books on *Radio-Active Substances* and *Practical Measurements in Radio-activity*. Elected a fellow of University College, London, 1912, and for some years past has acted as Recorder of Section "A" of the British Association.

Malgat, Capitaine (of Colonial Artillery) Emile, Technical Adviser in Wireless Telegraphy (since May, 1919), French Colonial Office.—B. Illzach (Alsace), 6th March, 1883. Studied (1902-04), Ecole Polytechnique of Paris. Sub-Lieutenant Colonial Artillery, 1904. Before the war Chief of the Radiotelegraphic Service of French Equatorial Africa. During the war served at the Central Radiotelegraphic Military Establishment.

Marchant, Edgar Walford, D.Sc., M.I.E.E.—David Jardine Professor of Electrical Engineering in the University of Liverpool. B. Kent, 1876. Educ. University School, Hastings, and Central Technical College. Graduated B.Sc. at London University with honours in physics and mathematics, and subsequently took the degree of D.Sc. After serving an apprenticeship appointed Superintendent of Lord Blythwood's Laboratory and Workshops at Renfrew, N.B., 1897, where he carried out many experiments in wireless telegraphy. Leaving Renfrew in 1900, served as chief assistant for one year at the Finsbury Technical College under the late Professor Silvanus P. Thompson. Lecturer in electro-technics at University College, Liverpool, 1901, and on the establishment of a Chair of Electrical Engineering in 1903 was elected the first professor. Closely associated with the late Mr. Duddell in the development of the oscillograph and joint author of a paper read before the Institution of Electrical Engineers on the study of the electric arc by the aid of oscillographs. Author of a number of articles on wireless and cognate subjects, and was one of the British delegates to the Scientific Commission on Wireless Telegraphy, held in Brussels, April, 1914. Vice-President of the Wireless Society of London, Past President of the Liverpool Engineering Society, Past Chairman of the Manchester Section of the Institution of Electrical Engineers. Address: 2, Ivanhoe Road, Sefton Road, Liverpool.

Marchant, W. H.—B. London, March 22nd, 1881. Commenced experimental work in connection with W/T (1904). From 1906-11 he served with De Forest Syndicate, Poulsen Company, and Lepel and Anglo-German W.T. Companies, being chiefly engaged in experimental work. Since 1911 he has devoted himself mainly to literary work and to teaching. Address: 4, Branch Hill Side, Hampstead, N.W.

Marconi, Alfonso.—B. Bologna, 1865. Educ. Bedford Grammar School, England, and Technical Colleges in Florence and Leghorn. Assisted

his brother in carrying out his first experiments in Wireless Telegraphy on one of his father's estates near Bologna. Joined the board of Marconi's Wireless Telegraph Company and the Marconi International Marine Communication Co., Ltd., July, 1909. Address: 75, Harley House, Regent's Park, London, N.W.1.

Marconi, Senatore Guglielmo, G.C.V.O., LL.D., D.Sc., M.I.E.E.—B. Bologna, Italy, April 25th, 1874. Irish on his mother's side. Educ. Leghorn and Bologna. First interested himself in the problem of wireless telegraphy, 1895. Visited England, 1896, and took out the first patent ever granted for a practical system of wireless telegraphy by the use of electric waves. Earliest experiments in England made at Westbourne Park. Shortly afterwards Senatore Marconi made some experiments for the Post Office officials. The Italian Government conferred upon Mr. Marconi the honour of knighthood. Senatore Marconi has been decorated by the King of Italy and the late ex-Czar of Russia, is an honorary doctor of many universities, including Oxford, Glasgow, Aberdeen, Liverpool, and Pennsylvania, besides having received the freedom of the principal Italian cities. In 1909 (in conjunction with Professor Braun) he was awarded the Nobel Prize for Physics. Elected a senator in the Italian Parliament (1914), being formally introduced to the Assembly on March 27th, 1915. On July 24th, 1914, the King bestowed upon him the Honorary Knighthood of the Grand Cross of the Victorian Order. He also holds many scientific awards granted by various societies and institutions, of which we may quote as a comparatively recent instance his presentation by the Royal Society of Arts, on April 12th, 1915, of their Albert Medal. Immediately on the declaration of war by Italy, Senatore Marconi was given the rank of Lieutenant in the Italian Army. He has been employed on important military missions to England by the Italian Government, and on July 29th, 1916, was promoted Captain "for exceptional services." At the beginning of September, 1916, he was transferred from the Italian Engineer Service to be temporary Commander in the Navy. Senatore Marconi visited the United States, 1917, as Member of the Official Mission sent by Italy to the U.S.A. Government. The University of Columbia invested him with the honorary degree of Doctor of Science on June 6th, 1917. The Franklin Institute of Philadelphia conferred their Franklin Gold Medal upon Senatore Marconi on May 15th, 1918. On June 26th, 1919, Senatore Marconi was appointed by H.M. the King of Italy Plenipotentiary Delegate to the Peace Conference at Paris, and in this capacity he signed the Peace Treaties with Austria and Bulgaria. At the end of 1919, Senatore Marconi was awarded the Italian Military Cross. Senatore Marconi, who is decorated with the Italian "Ordine Civile" of Savoy, has been nominated by the King of Italy to be a member of the Supreme Council of the same Order on the proposal of Signor Giolitti. In addition to being Chairman of the Board of Directors of the Marconi Company, Senatore Marconi is Chairman of the Banca Italiana di Sconto and of the Lloyd Sabaud Steamship Company.

Mariott, Robert Henry, Expert in Radiotelegraphy, U.S. Navy.—B. 1879. First experimented with wireless telegraphy in 1899, while student at the Ohio State University, U.S.A. Employed by the American Wireless Telephone and Telegraph Company, Philadelphia, 1901, for which company the erected stations

at Breille, Galilee and Barnegat, N.J. Chief Engineer of the Pacific and Continental Wireless Telephone and Telegraph Company. Installed three stations in California, at Avalon, Santa Catalina Island, and San Pedro, 1902. Employed with the Carstarphen Electric Company at Denver, Colorado, 1903. Constructed stations for the American De Forest Wireless Telegraph Company, and its successor, the United Wireless Telegraph Company, in Colorado, Wyoming, and Texas, 1905. In charge of this Company's construction and maintenance, 1910. Entered Marconi Wireless Telegraph Company of America, 1911. Entered the U.S. Government service as Radio Inspector, 1912. Chairman, 1916. Seattle Section Institute of Radio Engineers, Member of the Committee on Standardisation. Fellow and Past-President The Wireless Institute, 1909-12.

Marvá, General J.—B. 1846. Practically the pioneer of Wireless Telegraphy in the Spanish Army. Founder of first Spanish Aerodrome at Cuatro Vientos. Author of many scientific works (*Mecánica aplicada a las construcciones*, *Tracción en Vías ferreas*, etc.), Member, Royal Academy of Sciences, and International Association for experiments of materials.

McLeachlan, Norman W., D.Sc. (Eng.), M.I.E.E.—Associate of the Heriot-Watt College and a D.Sc. (Engineering) of the University of London. Author of many papers on various subjects in the *Journal of the Institution of Electrical Engineers* and other scientific journals. Research Engineer in service of Marconi Company. B. Longtown, Cumberland, 1888. Educ. Carlisle Grammar School and the George Watson and the Heriot-Watt Colleges, Edinburgh. Served apprenticeship with Messrs. Bruce, Peebles and Co. In 1909 was appointed Lecturer in Engineering and Mathematics at Newcastle-on-Tyne. In 1913, Superintendent of a Technical Institute, and Supervisor of Classes in Engineering Subjects in the Liverpool Technical Institutes. During the war carried out much research work for Government in aeronautics and anti-submarine devices, organising a laboratory at Air Ministry for research on liquid and gaseous oxygen apparatus for aircraft use. After the Armistice engaged in magneto research at the National Physical Laboratory, Teddington. Address: Marconi Research Laboratories, Hall Street, Chelmsford.

McMichael H. Leslie, Honorary Secretary, Wireless Society of London.—B. Birkenhead, 1884. Educ. Ackworth and Technical College, Birmingham. Apprenticed to Messrs. Duckett and Brown, Electrical Engineers, Birmingham, afterwards taking control of one branch of the business. Among the first to hold a receiving and transmitting licence in London, and had a highly efficient station in London prior to 1914. His work lay chiefly in the direction of sensitive synthetic crystals, and with Mr. R. H. Klein he was responsible for the synthetic crystal "Radiocite." One of the moving spirits in the foundation of the Wireless Society of London, and has taken an important part in its management since its origin; first in the office of Vice-Chairman, and since 1919 as Honorary Secretary of the Society. During the war served in the Wireless Instructional Section of the R.A.F. Member of the Institute of Radio Engineers and a Director of more than one commercial concern. Address: 32, Quex Road, West Hampstead, N.W.6.

Meissner, Alexander.—B. Vienna (Austria). Studied at Technical High School and University,

Vienna. Joined the Laboratory of the Telefunken Company, Berlin, 1907, and since that time has taken a very prominent part there in the development of the technique of wireless in Germany. (Introduction of the Flat-coil, the most favourable diameter for high-frequency coils, musical quench sparks, directional sparks, high-frequency machine, Telefunken compass, interference-reception with the detector, direct current cathode valve relay, for Morse reception, etc.). Introduced the production of oscillations with cathode valves, 1913, as well as the audiou with reverse coupling. Has published a series of articles on his work in different periodicals.

Meyer, Niels Rasmussen.—Director of Telegraphs to Danish Government since 1897. B. Rendsburg, Holstein, 1856. Educ. Polytechnic Academy, Copenhagen. Entered as a cand. Polyt. 1878, and during same year became assistant in building department of Royal Dockyard. State Railway traffic learner (1880); telegraph engineer attached to the State Railways in Jutland and Funen (1882). Holds several Danish Orders and number of foreign decorations. Address: Sigridsvej 4 Hellerup, Copenhagen.

Minohara, Dr., Lieut.-Com. (of Ordnance), Tsutomu, Professor at the Naval Academy.—Graduated from the Tokyo Imperial University, 1907. Entered Naval Arsenal of Maizuru and Kure and engaged in the manufacture of electrical arms and equipment of radiotelegraphy. Member of the Wireless Research Laboratory in the Electrical Department of the Arsenal, 1912. Proceeded to France and Germany to study, 1914. Ordered home in consequence of the outbreak of the European war and resumed service at the wireless laboratory. Inspector of post-bellum condition of radiotelegraphy amongst the Allied Powers, 1917. Returned to Japan, 1918, and assumed service at the wireless laboratory again. Now engaged in the equipment of radiotelegraphy aboard war vessels and merchantmen and construction of high-power land stations. Appointed to serve in the Department of Communications, 1919.

Monckton, C. C. F.—B. Great Malvern. May 8th, 1867. Educ. at Uppingham and Malvern Colleges, and at the Central Institution of the City Guilds. Employed by the Brush Electrical Engineering Company, from whom he passed to Messrs. Boustead Brothers, of Ceylon. Filled Government appointments of Jamaica and Trinidad. Superintendent of Telegraphs and Telephones to the Government of Fiji, 1911. Censor of telegrams during the war. Superintended the erection of the first Colonial Wireless Stations in the West Indies, 1904. Author "Radiotelegraphy" (1907). Acts in an advisory capacity to the High Commissioner for the Western Pacific with regard to all matters relating to wireless in the territories under that official's jurisdiction. Address: Suva, Fiji Islands.

Montefinale, Commander G., R. Italian Navy.—B. 1881. Educ. at Technical Colleges in Italy. Entered Naval Academy, Leghorn, 1899. Officer of the R.N., 1903. First appointment on H.I.M.S. "Andrea Doria," one of the first warships fitted with W/T. Assisted on board this vessel at important experiments in Adriatic and Ionian seas while Mr. Marconi and Marquis Solari experimented with new receiving devices at Ancona. W/T teacher at the R.N. Telegraphist School, 1908-10. Landed in Benadir coast, 1911, where he took part in erection of high-power Marconi station at Mogadiscio.

During the Turkish-Italian war served in the Red Sea flotilla blockading Arabian coasts as W/T officer. Director of Radiotelegraphic service in the Italian Somaliland, 1912-14, visiting the whole region, taking part in all the most important occupations and establishing new wireless links in the boundary zone (Mahaddei-Uen, Iscia Baidoa, etc.). After a period of studies at Leghorn served in the Dreadnought squadron for a long period of the war. In December, 1916, while attached to the Inter-allied staff of Brindisi, sent to Red Sea as Director of Erytrea W/T service. Remained in the Marconi H.P. station of Massawa till the Armistice, co-operating with British authorities in Aden and Egypt to establish new links. Constructed a duplex station at Asmara for metropolitan W/T service. During the summer, 1918, gave a brilliant demonstration of long distance reception in Abyssinia. Chief of W/T Laboratory and Department of Spezia, June, 1919. Author of several papers on wireless telegraphy. Active correspondent of various periodicals and reviews. Member of the specialist body of the Italian Navy.

Moreno Quesada, D. Manuel, Lieut.-Com., Spanish Royal Navy.—Sub-Director of the Compañia Nacional de Telegrafia sin Hilos, Madrid, where he carried out duties as Chief Engineer until 1st June of this year. Engaged in wireless work since the beginning of the application of this science in Spain. Besides the works relating to his career at the Spanish Naval School, he has passed the courses of Electrical Engineer at the London Central Technical College. One of the most notable officers of the Spanish Navy, having distinguished himself in the North African campaign. Granted Cross of Maria Cristina, one of the most important Spanish decorations. Has been also a representative of the Spanish Foreign Ministry in International Radiotelegraph Conferences.

Mullard, S. R., M.B.E., A.M.I.E.E.—B. 1883. 1908, Assistant Works Manager to Société Anonyme des Usines Pintsch. 1910-15, Head of Research Laboratory Edison & Swan Electric Co., Ltd., during which period invented and developed Pointolite Tungsten Arc Lamp. 1916-18, Lieut. R.N.V.R. att'd. R.N.A.S. 1918-19, Capt. R.A.F.; Head of Wireless Telegraphy Section at Air Ministry Laboratory, Imperial College of Science, S.W.7. 1919-20, S. R. Mullard, Wireless Valve Development and Construction, Contractor to Admiralty, War Office, Royal Air Force, and Post Office. September, 1920, Managing Director The Mullard Radio Valve Co. Club: R.A.F. Club. Address: Orient House, New Broad Street, E.C.2.

Nally, Edward Julian, President and Director Radio Corporation of America and Pan-American Wireless Telegraph and Telephone Company.—B. in Philadelphia, April 11th, 1859. Public school education. Married Lee Warren Redd, of Lexington, Kentucky, June 10th, 1897. Pioneer in different modes of communication in America. Started as a messenger boy for Western Union Telegraph Company, in St. Louis; later chief clerk to Superintendent, Minneapolis, Minnesota; appointed General Superintendent, Postal Telegraph-Cable Company, Chicago, 1890. He served this company for more than twenty years, being elected first Vice-President and General Manager, and Director, New York, April, 1907. Left service of Postal-Telegraph-Cable Company, 1913, to accept the position of Vice-President and General Manager of the Marconi Wireless Telegraph Company of America. 1919, elected President and Director, Radio Corporation of America.

Clubs: Caxton, Brothers of the Book, Lawyers, Pennsylvania Society, American Irish Historical Society, American Geographical Society, National Geographic Society, Ends of the Earth. Residence: The Trees, Ossining, N.Y. Business address: Woolworth Building, New York.

Navarro y Ortiz, D. Benito, Major, Spanish Royal Engineers.—Chief of the Wireless Service of the Army permanent land stations (1918). In 1913 took charge of the Spanish Army Station of Carabanchel EGC (Madrid), until 1918. Decorated by the Spanish Government with the White Military Cross (December, 1919) for his knowledge and merit in wireless matters. One of the most distinguished among the Spanish Royal Engineers in connection with Wireless Telegraphy. Has largely contributed to the wide development of this important scientific branch in Spain.

Nicholls, Lt.-Col. Hon. Frederic, J.P., F.R.C.I. (1911). President Marconi Wireless Telegraph Co. of Canada, Ltd.—B. England, November 23rd, 1856. Educ. Stuttgart, Germany. Went to Canada 1874. Founder of "Canadian Manufacturer," the then Official Organ and Spokesman of the manufacturing interest in Canada, of which he was editor and proprietor until 1893. Consul for Portugal. President Toronto Press Club, 1890. President Athenæum Club, 1893. Life Member Board of Trade. Hon. Member Canadian Press Association. Member Executive Committee, Canadian Manufacturers' Association. Gazetted Hon. Lieut.-Col., October 17th, 1914. Appointed to Senate January 20th, 1917. President and or Director of many industrial and electrical concerns. Conservative; Anglican. Clubs: Bankers' Club of America, New York; York, Toronto; Albany; Engineers'; etc., etc. Address: 79, St. George Street, Toronto, Ontario, Canada.

Noble, Sir William, Engineer-in-Chief to the British Post Office.—Commenced his career in Aberdeen Telegraph Office as a telegraphist. In 1893, Engineer for the north-east area of Scotland with headquarters at Aberdeen. In 1897 promoted to Headquarters, London, as First-class Engineer. Subsequently successively Technical Officer, Assistant Superintending Engineer, London, Staff Engineer at Headquarters, Superintending Engineer, London, and in 1912 Assistant Engineer-in-Chief, succeeding to the premier position in June, 1919. In 1919 the King of the Belgians created him a "Chevalier de l'Ordre de la Couronne" for "constant and generous help" during the war. Knighted June, 1920. Address: General Post Office, London, E.C.

Norman, Major the Rt. Hon. Sir Henry, B.A., F.R.G.S., A.M.I.E.E., 1st Bt. cr. 1915, Kt. cr. 1906, M.P. (L) Blackburn since 1910. Chairman of Imperial Wireless Telegraphy Committee (appointed November, 1919).—B. Leicester, September 19th, 1858. Educ. privately in France; Harvard University (B.A.); Leipzig University. Officer of Legion of Honour; Commander of Order of the Saviour; Officer of S.S. "Maurice" and "Lazare." Assistant Postmaster-General, 1910; Chairman War Office Committee on W.T (1912); member of Committee on National Telegraphic Research and P.O. Telegraph Organisation Committee; member of British Association Committee of Radiotelegraphic Investigation and of International Committee of Radiotelegraphic Research; Vice-President of Wireless Society of London; Fellow of Physical Society; Fellow of American Institute of Radio Engineers; Liaison Officer with French Government for Military Inventions; Vice-Chairman

Imperial Communications Committee, and Chairman of Wireless Sub-Committee. Address: The Corner House, Cowley Street, S.W.1.

Orme, Major Robert, B.A.—B. at Bray (Ireland), October 20th, 1865. Educ. in Irish schools and graduated B.A. at Trinity College, Dublin. Initiated career by taking up Electrical Engineering under Hugh E. Harrison at Hammonds College, and then apprenticed to Anglo-American Brush Company. Since 1900 concentrated chiefly on wireless telegraphy and atmospheric electricity. Granted commission in R.F.C., January, 1915, organised and was given command of the Wireless School, Brooklands, November, 1915. Moved himself and his staff from Brooklands to Biggin Hill in September, 1916, where they were constituted first as the Wireless Testing Park and later as the Experimental Establishment, R.F.C. Address: Hollycroft, East End, Newbury, Berks.

Pannill, Charles Jackson.—B. Petersburg, Va., May 13th, 1879. Entered Navy 1898. Chief Telegraphist of United States Coast Signal Service. Entered service of Professor Reginald A. Fessenden, 1902. Conducted experiments in radio communication across Hampton Roads. Installed communication by radio between New York and Philadelphia, 1903. Installed first radio outfit on United States battleship. Conducted experiments between stations of General Electric Company at Lynn and Schenectady; also between Brant Rock, Mass., and Machrihanish Bay, Scotland. Holds commercial first-grade licence No. 1. Entered service of United Wireless Telegraph Company as Division Superintendent, 1909. Erected shore radio stations on Great Lakes, later in charge of division south of New York. Entered service of Marconi Wireless Telegraph Company of America, 1912. Superintendent, Southern Division. Entered service of United States Government, 1914, as expert radio aid, Naval Radio Service. Promoted to Assistant to Director Naval Communications in charge of commercial radio service, 1917. Now General Manager, Independent Wireless Telegraph Company, New York. Fellow of the Institute of Radio Engineers. Member Washington Society of Engineers. Member of the Geographical Society.

Parker, J. N.—Representing Indian Post and Telegraph Department in England at the India Stores Depot, Belvedere Road, London, S.E. Son of the late Major-General N. F. Parker, of the Bengal Army. B. July 6th, 1881, in Calcutta. Educ. Clifton College and the Royal Indian Engineering College, Coopers Hill. Passed out of the latter institution (1902) with diploma of Associate. Joined Indian Government Telegraph Department. Appointed to Electrical Engineer's Office, Calcutta, January, 1904. Accompanied Mr. M. G. Simpson, then Electrical Engineer-in-Chief, to Burma, February, 1904, to assist in preliminary wireless experiments. Continued his connection with the Electrical Engineer's Office and the technical side of telegraph work, which included the erection of several of the 30 kw. Marconi stations belonging to the Department. Superintendent Indian Wireless Telegraph Stations, 1914-19. Represented the Post and Telegraph Department at Poona in connection with the erection of the Imperial Chain Station, until work stopped early in 1915. Address: India Stores Depot, Belvedere Road, Lambeth, S.E.1.

Pedersen, P. O., Professor in the Royal Technical College, Copenhagen. B. at Sig, near Varde, Jutland, June 10th, 1874. Entered Royal Technical College, Copenhagen (1892). Cand.

Polytechnic (1897); Chief Engineer of Telegrafonen, Ltd. (Poulsen Patent), 1899-1902. Gold Medal Danish Society of Sciences (1907). Lecturer at the Royal Technical College, Copenhagen, and Professor from 1912. On board of Dansk Telegrafonfabrik (Danish Telegraphone Co., Ltd.), 1903-12, as well as on Elektroteknisk Forening (Electrotechnic Association) from 1910; Chairman from 1916. President Danish Institute of Civil Engineers, 1902. Director of Det Kontinentale Syndikat for Poulsen Radiotelegrafi (Continental Syndicate for Poulsen Radiotelegraphy) from 1911-19. Member of International Electrotechnical Commission. Fellow Inst. of Radio Engineers since 1915, Fellow Am. Inst. Electrical Engineers since 1920, and a Fellow Royal Danish Academy of Science since 1917. Member of the Telephone Commission (1917), of the Control Committee of licensed Telephone Companies, of the Commission on the training of radio operators, and of the Radio Commission of 1920. His contributions to electro-technical literature have been both important and numerous. Amongst those of recent appearance we may enumerate the following: "Om Poulsen-Buens Teori" (Copenhagen, 1917); "On the Theory of the Poulsen Arc" (*Proc. Inst. Rad. Eng.*, New York), 1917 and 1919; "Poulsen-Buens Virkemaade," *Fysisk Tidsskrift*, Vol. xvii (Copenhagen, 1918); "Den Elektriske Buens Elektroteori" (*Elektrotekniker*, Copenhagen, 1917); "The Lichtenberg Figures" (Copenhagen, 1918); and "Townsend's Teori for Støedionisation" (Copenhagen, 1918). Address: Amalievej 1, Copenhagen, V. Denmark.

Penido, Antonio Nogueira, Director General of Brazilian Telegraphs (since 1918).—B. September 25th, 1864, at Juiz de Fora, Minas Geraes. Civil Engineer of the "Escola Polytechnica" of Rio de Janeiro (diploma March, 1886). Was engaged in the construction of the Central Railway of Brazil; the Recife-Cuaruru Railway, the Sorocabana Railway; port works of Rio de Janeiro and works at Saneamento of the town of Juiz de Fora. Successively Engineer of Public Works of the State of São Paulo, Chief of Traffic of the Sorocabana Railway, Chief Engineer of the Itapura-Corumbá Railway, and Inspector-General of the Mogiana Railway.

Petavel, Sir Joseph Ernest, K.B.E., D.Sc., F.R.S., M.I.Mech.E., A.M.Inst.C.E., Director National Physical Laboratory, Teddington.—B. 1873. Educ. University College, London. Scientific Research at the Royal Institution and at the Davy Faraday Laboratory, 1896-98. John Harling Fellow, Owens College, Manchester, 1900-03. Scientific Manager, Low Temperature Exhibit of the British Royal Commission for the St. Louis Exhibition, 1904. Professor of Engineering and Director of the Whitworth Engineering Laboratories, University of Manchester, 1908-19. Publications: *Papers in the Philosophical Transactions of the Royal Society*, "The Philosophical Magazine," "Engineering," etc. Member of Aeronautical Research Committee and other Government Committees connected with Aviation. Member of Committee on Imperial Wireless Scheme Clubs: Atheneum; Royal Automobile, Primrose Club, London. Address: National Physical Laboratory, Teddington, Middlesex.

Petersen, Harmod.—Chief Engineer and Inspector of Wireless Telegraphy, Norwegian Government Telegraph Department. B. Christiania, 1875. Graduated as electrical engineer at Bergen Technical College, afterwards attending the Polytechnic University at Karlsruhe, Baden. Chief of the Telegraph Schools, 1900-13.

One of the pioneers of wireless telegraphic expansion in Norway. Superintended the first radio experiments, 1901. Later on formulated schemes for all wireless land stations along Norwegian coast. Member of the first International Conference on Wireless Telegraphy, Berlin, 1906. Engineer-in-Charge during the erection of a wireless station at Spitzbergen (1911), which communicates with a similar station in the North of Norway. Remained in charge during its first winter. Chief of the Norwegian Wireless Department, 1913. Superintends the land stations. Also Government Wireless Inspector, controlling all the ship stations of Norway. Published a number of technical books for instructional purposes, principally on the subject of telephony and telegraphy, both wired and wireless.

Petit, Gaston Emile.—Electrical Engineer in the French Postes et Télégraphes; Technical Director of the Compagnie Générale de Radio-télégraphie, B. Paris, 1877. Chief of the Service of Wireless Telegraphy at the French Postes et Télégraphes, 1905-11. Member of the International Conference on Wireless Telegraphy, Berlin, 1906.

Pickard, Greenleaf Whittier, A.A.A.S.—Electrical Engineer. B. Portland, Me., February 14th, 1877. Educ. Westbrook Seminary, Lawrence Scientific School, Harvard, and Mass. Institute of Technology. Has made a special study of wireless telegraphy and telephony, and has taken out many United States and foreign patents for wireless inventions. Executed good pioneer work in radiotelephony, and still actively engaged in this branch of the science. Began radio work, 1899, at Blue Hill Observatory, Milton, Mass., under a grant from the Smithsonian Institution. Became associated with Harry Shoemaker, 1901. On the engineering staff of the American Telephone and Telegraph Company, 1902-06. Developed a practical system of radiotelephony, obtaining successful speech transmission without wires, 1902. From 1906 until the present date has been connected with the Wireless Specialty Apparatus Company as consulting engineer. Practices extensively as patent expert in wireless patent litigation. Consulting electrical engineer to the Huff Electrostatic Separator Company. Fellow of the American Institute of Electrical Engineers. Member of the American Chemical Society. Member of the Society of Chemical Industry. Member of the Institute of Radio Engineers. Club: Engineers'. Private address: Newton Centre, Mass. Office address: C and Fargo Streets, Boston, Mass.

Pletts, John St. Vincent.—B. Ryde, I. of W., 1880. Educ. locally and at Central Technical College. Joined Marconi's Wireless Telegraph Company, Ltd., 1899. Constructed wireless stations in Hawaii, Labrador, the Congo, Russia, and the Far East. Deputy Chief of Staff, 1906. Head of that Company's newly formed Patent Department, 1910. Expert in Cryptography at the War Office, 1911. Consulting Engineer, 1919. Member of various scientific societies, and author of a number of technical articles. Address: Marconi House, W.C.2, and Shalston House, Ewell Road, Surbiton.

Poulsen, Valdemar, Eng. D.S., D.Ph. (h.c.) Leipzig (1909).—B. Copenhagen, November 23rd, 1869. Studied at University of Copenhagen, 1889-93. Entered technical department Copenhagen Telephone Company, 1893, and for a number of years superintended electrical testing operations. Holds Medal for Merit in gold with crown. Collaborated with Prof. P. O. Pedersen

for many years. Member of the board of the Telegrafonen, Ltd. (Patent Poulsen), 1902-16. Joined board of Dansk Telegrafonfabrik, Ltd., 1909, and that of Poulsen Wireless Telephone and Telegraph Company, U.S.A. (1909-11). Fellow of Danish Society of Sciences (1914). Grand Prix at Paris in 1900 for telephone work. Initiated in 1903 a method of generating continuous electrical waves. Danish Society of Sciences' Gold Medal (1907). Publications: "Une Méthode pour Produire des Oscillations non Amorties et leur Emploi dans la Télégraphie sans Fil"; and "La Téléphonie sans Fil: Rapport Officiel au Congrès International des Applications Electriques," Turin, September, 1911 (Copenhagen, 1912). Address: Gentofte Møllegaardsvej 6, Copenhagen.

Prince, Major Charles Edmond, O.B.E. Technical Manager of the Aircraft Department, Marconi's Wireless Telegraph Company, Ltd.—B. Capetown, 1874, son of Rev. E. B. Prince sometime Vicar of Tor Mohun, Torquay. Educ. Clifton College (Science Exhibitioner) and Faraday House. Married in 1908 Amelia Ella Verner. Published 1905 "Ode on Poetry and other Poems" (Harrison, Pall Mall), etc. Joined Marconi's Wireless Telegraph Company, Ltd., 1907, specialised in Research Work and particularly in Wireless Telephony. Demonstrated first Marconi Field Station in Italy and Switzerland, 1909. Instituted important improvements in Bellini-Tosi Direction Finding System. Granted commission in Westmorland and Cumberland Yeomanry, 1911. Attached R.F.C., April, 1915. Developed at Brooklands in same year first aircraft wireless telephone. Gazetted experimental officer (First Class), December, 1915. Mentioned in despatches 1918, and in the same year appointed Major. Granted M.B.E. 1918, O.B.E. (Military Division), 1919. Addresses: Stubbings Manor, Burchetts Green, Berks.; 63, Drayton Gardens, London, S.W.

Pupin, Dr. Michael I., Director of Research Laboratory, Columbia University, New York, ex-President, Institute of Radio Engineers.—B. Hungary, October 4th, 1858. Went to the United States 1874. Studied at Columbia University. Graduated 1883. Study continued at Cambridge, England, and Berlin. Returned to the United States. Professor of Mathematical Physics at the Columbia University, 1891. Among his first original work may be mentioned the development of electrical resonance, before the introduction of wireless telegraphy. Patents issued to him on electrical selectivity were licensed to Marconi's Wireless Telegraph Company, 1903. Has worked extensively in the development of his inventions in connection with telephones and telegraphs, and many of his improvements are known by his name throughout the world. Has recently been engaged in the development of a new method of electrical selectivity to be used in connection with wireless telegraphy. Has also been engaged in research work in wireless telephony.

Ramsing, Holger U., Lieut.-Col., Danish Engineer Corps. Chief of Military Wireless Service, Denmark, since November, 1918.—B. Copenhagen, March 13th, 1868. Sub-Lieut., 1888, and Lieut. Engineer Corps, Lieut. Dan. West Indian Forces, Inspector of Public Works, Land Surveyor and Director of Government Telegraphs, Danish West Indies, 1895-1900; Capt. Engineer Corps and Chief of 4th Engineer (Telegraph) Company, 1901-06; Administrative Engineer-of-Fortification of Fortress of Copenhagen, Western District, 1907-18. Teacher of Fortification Military Academy since 1908. Member of Technical

Committee of Engineer Corps since 1916. Member of Military Telegraph and Telephone Commission, 1901-07, and since 1918. Lieut.-Col. Engineer Corps and Chief of Telegraph Battalion (3rd Eng. Batt.), 1918. Address: Ribegade 8, Copenhagen.

Bogo, Capt. T. R. Moraes, Chief of the Radiotelegraphic Service, Brazilian Navy.—B. Rio de Janeiro, March 8th, 1882. Completed training at Naval Academy, 1900. Served for a few years on ships, studying electricity and torpedoes. Torpedo Lieutenant in the Professional Torpedo School. Began studying radiotelegraphy when first wireless stations were installed in Brazilian Navy, 1904. Perfected his knowledge of the subject on special trips to Europe and America. Assistant in the Radio Department of the Navy on various occasions. Appointed (1914) Chief of the Radio Service, a post which he still holds. Address: 22, Ipanema Copacabana, Rio Janeiro.

Bendahl, R. H.—B. 1878. Electrical engineer in the Royal Swedish Navy Department, 1909; attached to the Swedish Board of Admiralty, 1912: wireless expert attached to the Swedish Navy. Knight of the "Nordstjärna" Order, and holder of several foreign orders. Address: Djursholms, Ösby, Sweden

Reo-h, Alexander, Wireless engineer, American Marconi Company.—B. Sheffield, England, 1884. Educ. Sheffield Science School and Sheffield University College. Graduated in electrical engineering, 1902, winning the Mappin Medal and Prize in that year. Entered the service of the English Marconi Company in June, 1902, and undertook construction and operating work for that company in England, Holland, Germany, and Egypt. Appointed engineer with the Canadian Marconi Company, 1905. From 1909 to 1911 temporarily in complete charge of the business of the Canadian Marconi Company, during which time that company's contract with the Canadian Government for the operation of the Great Lakes stations was negotiated, as well as the contract between the Canadian Company and the Newfoundland Government. Chief Engineer of the Canadian Marconi Company, 1917, and at the beginning of 1918 he relinquished this position to take an appointment on the engineering staff of the American Marconi Company. Appointed, 1920, Plant Engineer, Radio Corporation of America. Address: 233, Broadway, New York.

Ribeiro, Alvaro Nunes, Commander and Director, Radiotelegraphic Station of Monsanto.—B. Lisbon, 1879. Educ. National Lyceum and the Lisbon Polytechnic School. Cadet in the Naval School, 1898. Completing his training there, was commissioned to join an expeditionary force to the Zambesi. On his return to Portugal he was appointed naval instructor at the Torpedo and Electrical School, where he devoted himself to the study of wireless. Leading member of the Naval Commission on Organisation, 1910, where he strongly advocated the establishment of a naval staff for war purposes. Member of Parliament. Member of the Commission on Posts and Telegraphs. Secretary to the Naval Commission. As a member of the Posts and Telegraphs Commission he fathered a Bill for the organisation of Portuguese Colonial Wireless, and as soon as the Act had been passed by Parliament a contract to carry out its provisions was concluded with the Marconi Company. Commanded the vessels "Berrio" and "Patrao Lopez" engaged in rescue work, when he met with a serious accident trying to save a cruiser.

As a consequence returned to shore service, where he organised the Portuguese Coast Service, and formulated a code of regulations. Address: R. Vieira da Silva 64, Lisbon.

Rinde, K. Werner J., son.—B. Falun, 1882. Educ. Falun and Göteborg University. Telegraph clerk, controller, etc. Studied W/T and telephony systems and traffic, during voyages to Holland, Great Britain, Germany, Austria, Italy, and U.S.A. 1912-13 (autumn 1912 for some months with the Marconi Companies in Rotterdam and at sea). Teacher at W/T school of Royal Swedish Telegraph Board from 1914. Supt. of the W/T station at Vaxholm, Sweden, 1914-16, of Karlsborg Radio since beginning of 1917. Address: Karlsborg, Sweden.

Robinson, James, M.Sc. (Dunelm), Ph.D. (Göttingen).—B. September 9th, 1884. Studied Mathematics and Physics at Armstrong College, University of Durham and at the University of Göttingen. Pemberton Fellow of Armstrong College, University of Durham, 1906-09. Publications (Physics): *Dust Figures in Kundt's Tube* (papers in "Physikalische Zeitschrift," *Philosophical Magazine*, *Proceedings of the Physical Society of London*, between the years 1908 and 1913). *Absorption of Cathode Rays in Gases* (papers in "Annalen der Physik," "Proceedings of the Philosophical Society of the University of Durham, in 1910). *Photoelectric effect* (papers in the "Philosophical Magazine," 1910-15). *Papers on Directional Wireless and Reception on Aircraft* (in "Radio Review"). Appointments: Armstrong College, Demonstrator in Physics, 1906-07; Lecturer in Mathematics, 1909-10. University of Sheffield, Lecturer and Demonstrator in Physics, 1910-12. East London College, University of London, Lecturer in Physics, 1912-15. Examiner in Physics, University of London, 1912-15. Wireless experience: Commenced in 1915 in the R.N.V.R., as Lieut., R.N.V.R. In 1917 attached R.N.A.S. for experimental W/T work. Various patents. Address: Chief Experimental Officer at the Instrument Design Establishment, Biggin Hill, Kent.

Robinson, Samuel S., Rear-Admiral U.S. Navy. Member of the Institute of Radio Engineers.—B. May 10th, 1867. Graduated from the U.S. Naval Academy, 1888. In personal charge of the Division of Radiotelegraphy in the Bureau of Equipment, Navy Department, 1904-06, and in general charge from 1909-11. Author of the "Manual of Wireless Telegraphy for Naval Electricians," first issued in 1906, and revised for several subsequent editions. Address: Boston Navy Yard, Boston, U.S.A.

Rodrigues, Apolinio Gomes da Silva, Flag Captain in the Portuguese Navy.—B. May 31st, 1866. Finished education and entered Portuguese Navy in 1886. Became Professor of Electricity and Torpedoes at the Naval College in 1902, and Professor of Electricity of Naval Auxiliary College, 1903. Received his present rank of Flag Captain in 1907. Entrusted with embodiment of Naval Regulations concerning wireless in 1909. Elected Member of Advisory Committee on wireless in the Portuguese Navy in 1910. Address: Portuguese Admiralty, Lisbon.

Rydin, Sven Ludvig Herman.—Since 1905 Director of Telegraphs in Sweden.—B. Upsala, October 2nd, 1861. Graduated in Law, Upsala, 1885, solicitor's clerk 1887, Registrar in the Lower House 1888-90, Registrar in the Upper House 1890-97. Auditor attached to the Swedish State Railways 1890-97, Registrar attached to the Board of the State Railways 1895-96,

assistant to the Director of the State Railways 1896-97, Member of the Board of Telegraphs 1897-1902, Under-Secretary of State for Home Affairs 1902, Commander of the "Nordstjaerna." Order and holder of several foreign decorations. Address: Kungl. Telegrafstyrelsen, Stockholm.

Salmond, Captain J. S. C., R.N.—B. 1882. Entered "Britannia," 1897, left 1898. Served in China in "Barfleur," landed in the Boxer operations, 1900. Mentioned in despatches. Served in Pacific in "Grafton" and "Flora." Qualified as torpedo lieutenant, 1905. Served in Atlantic in "Antrim" as lieutenant (T.). Served in Wireless Telegraphy Experimental Department, "Vernon," 1908-11. Squadron Wireless Telegraphy Officer, 2nd Battle Squadron in "Hercules," 1911. Fleet Wireless Telegraphy Officer, Home Fleet (later Grand Fleet) in "Neptune" and "Iron Duke," 1912-15. Wireless Telegraphy Assistant to D.N.O. Admiralty, 1915-17. In command of "Odin" in Red Sea, 1917-19, mentioned in despatches for operations against Turkish forces in the "Asir" and "Yemen." Serving in Signal Division, Admiralty, on Wireless Telegraphy duties. Member of Radio Research Board. Address: Admiralty, London, S.W.1.

Saltzman, Charles McKinley, Brigadier-General, Executive Officer in the Chief Signalling Office —B. 1871, State of Iowa. Started business as railway telegraphist and graduated at West Point, 1896. As cavalry officer took part in the Spanish-American War, 1898. Signal officer during the Insurrection in the Philippine Islands. Transferred to the Signal Corps of the U.S. Army, 1901. Since identified with the electrical, cable and radio work, U.S. Army. For a number of years in charge of the Electrical Laboratory of the Signal Corps in Washington, where radio equipment of the U.S. Army is designed and tested. In charge of the radio work of the U.S. Army on the Panama Canal. Represented the United States at the International Radiotelegraphic Conference of London, 1912. Member of the Inter-Departmental Board which prepared regulations for the control of radiotelegraphy in the U.S.A. Address: Office of the Chief Signal Officer, Signal Corps, U.S.A., Washington, D.C.

Sankey, Captain M. P. H. Riall, C.B., C.B.E., R.E. (Ret.)—B. Nenagh, Ireland, 1853. Educ. Switzerland, Royal Military Academy, Woolwich, School of Military Engineering, Chatham. Served in England, at Gibraltar, and as Instructor in Fortification at the Royal Military College, Kingston, Canada. Posted to the British Ordnance Survey, and had charge of the Trigonometrical Division, the Electrotyping Department and the Workshops. Retired from the service (1889) to join the Board of Messrs. Willans and Robinson, Ltd., and (1904) took up consulting work. Shortly afterwards joined the Boards of the Marconi's Wireless Telegraph Company, Limited, and of the Marconi International Marine Communication Company, Limited. Also a Director of several other companies. An accepted authority on thermodynamic problems. Member of the following institutions: Civil Engineers, Mechanical Engineers (President 1920), American Mechanical Engineers, Electrical Engineers, Iron and Steel, Naval Architects Junior Engineers, and Gas Engineers. Member of the Governing Board of the National Physical Laboratory and of the Wireless Telegraphy and Gaseous Explosives Committees of the British Association. Served during war as Hon. Engineering Advisor to the Director of Fortifications and Works. Served on the Hon. Valuation Advisory Committee of

Experts, dealing with the plant and buildings installed by manufacturing firms for munition purposes. Address: 57, Castle Bar Road, Ealing, W.5.

Sarnoff, David—B. in Russia, February, 1891. Entered the United States July, 1900. Started business 1906, and in 1907 received an appointment as Wireless Operator at the Marconi Station located at Siasconset, Nantucket Island, Mass. Served at various ship and Shore Stations, and eventually became Manager at the Marconi Station at Sea Gate. Has held a number of responsible positions in the service of the Marconi Wireless Telegraph Company of America, being now Commercial Manager of the Radio Corporation of America. Vice-President and Director of the Pan-American Wireless Telegraph and Telephone Company. Secretary of the Institute of Radio Engineers for 1915-1916-1917. Author of a paper on Radio Traffic read before the Institute of Radio Engineers, and a number of other papers on wireless telegraphy. Addresses: 90, Pinchurst Avenue, and 233, Broadway, New York.

Sayeki, Mitsuru, Chief Radio Engineer Installation and Inspection Section of the Direction General of Posts and Telegraphs since 1908.—B. Japan, 1871. Entered Naval College, 1889. Entered the Electric Technical Laboratory, in the Ministry of Communications, 1895, and has been engaged in the investigation of radiotelegraphy since 1899. The greater part of the "Teishinsho" Radio System was invented and designed by him. All the Government and private commercial coast stations were designed and erected by him. Nearly all the commercial ship stations in Japan are using the apparatus designed by him. Received prizes and medals for his investigations in radiotelegraphy.

Schledermann, Helmuth Joh. Christian, Electrical Engineer in Chief to the Royal Danish Navy. Knight Dannebrog.—B. Copenhagen, September 24th, 1876. Educ. Royal Naval Engineering College; Polytechnic Academy of Copenhagen. Further training with electrical firms in foreign countries. Controls the Electrical and Wireless services of the Danish Navy, also Inspector of Danish W/T stations and Electrical and W/T adviser to the Danish Lighthouse Department. Member of the Danish Engineers' Assn., the International Electro-Technical Commission and a Commission dealing with erection of a high-power wireless station in Denmark. Publication: A manual on W/T for the Danish Royal Navy. Address: Taffelbays Alle 11, Hellerup, Denmark.

Schwill, Fr., Sub-Director of the International Bureau of the Telegraphic Union at Berne.—B. Strasburg (in Alsace), April 21st, 1875. Started career as Member of the German Post and Telegraph Service. Took part in the International Radiotelegraphic Conference at Berlin in 1906, at the close of which he was appointed by the Swiss Federal Government to the International Bureau of the Telegraphic Union to organise and supervise the new Radiotelegraphic Section established by the Berlin Conference. Address: Bureau International de L'Union Télégraphique, Berne.

Shaughnessy, Edward H., O.B.E., M.I.E.E., M.I.Radio.E.—B. 1871. Engineer in charge wireless section, Engineering Department, British Post Office. Entered Post Office Engineering Department, 1896, served in experimental, testing, telegraph, and cable sections, specialising on underground and submarine cables. Served as a cable engineer (1895) on s.s. "Faraday," during the laying of a submarine cable in Gulf of Mexico, and the repair

of other cables. After five years in the provinces on construction and maintenance work returned to London (1913) to take up present position. For many years lectured on telegraphy, telephony, etc., at various London Technical Institutes. Member of the Radio Research Board. Post Office representative on Committee of Wireless Section, Institution of Electrical Engineers. Vice-President, Wireless Society of London. Examiner in Telegraphy for the City and Guilds of London Institute. Member of some committees and panels of the British Engineering Standards Association. Address: Engineering Department, General Post Office, London.

Simpson, Lt.-Col. Adrian F.H.S., C.M.G., A.M.I.E.E. (late) **R.E.**—B. Edinburgh, 1880. Educ. in his native city, and at Clifton and the Royal Military College, Sandhurst. Commissioned in His Majesty's Forces, 1900. Served in India, being transferred to the Regular Indian Army. Visited Russia 1903-5 for linguistic study. Becoming interested in wireless telegraphy, left the Army and started work with the English De Forest Wireless Telegraph Syndicate. His connection with Marconi's Wireless Telegraph Company commenced with his joining the Field Station Department. On the formation of the Russian Company of Wireless Telegraphs and Telephones, 1908, appointed managing director of that company. Member of the Anglo-Russian Chamber of Commerce. During the war served in Russia and at the War Office. Late Director of Wireless Telegraphy under the Government of India. Chevalier of Order of St. Anne, 3rd Degree, and of Order of S. Stanislas, 2nd Degree, with Crossed Swords. Director and Joint General Manager Marconi Wireless and International Companies.

Sins, Ernest.—B. 1859, Besançon, Alsace, where he received his early education. Joined the Ecole Polytechnique, and began his career by enrolling in the Corps of Telegraph Engineers. Participated in the organisation of the telegraphic and telephonic systems in Tunisia. Received an appointment in the Central Office of Posts and Telegraphs, Paris, 1892, where he ultimately rose to the position of Telegraph Engineer-in-Chief. Chief of the Correspondence Department of International Telegraphy, 1899, and took special interest in wireless telegraphy. Represented his country at the International Conferences on Radiotelegraphy held at Berlin, 1903, and acted as Secretary to the Commission appointed by the latter Conference for drawing up regulations. Sub-Director of the French Telegraphic Department, 1911, but resigned from the public service in the same year in order to be at liberty to take part in the development of wireless industry. One of the founders and directors of the Compagnie Générale Radiotélégraphique, and was afterwards managing director to the Compagnie Universelle de Télégraphie et de Téléphonie sans Fil. Since the beginning of 1918, general manager of the Compagnie Générale de Télégraphie sans Fil.

Slee, Commander J. A., C.B.E., R.N. (Ret.)—B. May, 1878, Wimbledon. Educ. on training ship "Britannia." First appointment as midshipman was to H.M.S. "Centurion," on which vessel he sailed for China, 1894, being transferred, three years later, to the brig "Nautilus" for sailing experience. Passed for his lieutenant's commission, obtaining four firsts out of a possible five. After service on the "Decoy," "Ernest," "Anson," and "Severn," qualified as Torpedo Lieutenant, and spent a year on the staff of the "Defiance" at Devonport, where he gained his first wireless experience,

1901. Whilst attached to H.M.S. "Queen," 1906, eyesight trouble developed and he was obliged to transfer to shore service. For two years after quitting the sea he served as one of the Wireless Telegraph Experimental Officers on the "Vernon" at Portsmouth, and from 1908 until last year was in charge of all shore wireless and war signal stations in Great Britain. Promoted Acting Commander, 1913. Acting Captain, 1918. On the formation of the Wireless Board, Captain Slee was appointed its chief. Awarded an O.B.E., January, 1919, C.B.E., April, 1919. Retired from the Navy due to the eyesight trouble mentioned above, December 1st, 1919, with the rank of Commander. Joined the Marconi International Marine Communication Co. as Technical Superintendent and Adviser, January, 1st, 1920. Address: 7, Elvaston Place, London.

Smith-Rose, Reginald Leslie, B.Sc., D.I.C., A.R.C.S.—Educ. Imperial College of Science and Technology: (a) Royal College of Science, 1912-14; (b) City and Guilds (Engineering) College, 1914-15. Diplomas: Bachelor of Science, London, First-class Honours; Royal Scholar, Physics, First Place; Associate of Royal College of Science (A.R.C.S.), Class 1, Physics Prizeman. Diplômé of the Imperial College (D.I.C.) for Research Work in Wireless Telegraphy at the City and Guilds (Engineering) College. Practical experience with Messrs. Siemens Bros., Woolwich, from 1915-19; engaged on experimental work in connection with Military, Manual and Automatic Telephones; and latterly with Thermionic Valve Amplifiers for Telephone Lines and Wireless Receiving sets. Now an assistant at the National Physical Laboratory, engaged on research on Thermionic Vacuum Tubes and general wireless work. Member of Sub-Committee "D" on Thermionic Valves, of the Radio Research Board of the Department of Scientific and Industrial Research. Senior Lecturer in Wireless Telegraphy and Telephony at the Polytechnic, Regent Street, W. Past Chairman and Hon. Secretary respectively of the Students' Section of the Institution of Electrical Engineers. Author of various scientific papers. Address: National Physical Laboratory, Teddington.

Snell, Sir John Francis Cleverton, Kt. (Cr. 1914), **M.Inst.C.E.**—Chairman, Water-Power Resources Committee of the Board of Trade, and member of the Imperial Wireless Telegraphy Committee. Past President of the Institution of Electrical Engineers, Fellow of the American Institute of Electrical Engineers, and a member of many other scientific societies. Until recently partner of Preece, Cardew, Snell and Rider, Consulting Engineers. Now Chief Electricity Commissioner under the "Electricity (Supply) Act, 1919." B. at Saltash, Cornwall, December 15th, 1869. Educ. Plymouth Grammar School and King's College, London. After service (1883) with Woodhouse and Rawson, and (1889) with Crompton & Co., appointed resident Engineer for the late General Webber, C.B., R.E., at South Kensington, and subsequently became the General's Chief Assistant. Appointed Borough Electrical and Tramways Engineer, Sunderland, August, 1896. In 1906 started practice as Consulting Engineer, Westminster, first with Mr. S. S. Moore & Co. and afterwards amalgamating with Preece, Cardew, Snell and Rider in 1910. Acted as principal technical witness for the Crown in the arbitration proceedings of the National Telephone Company, 1912. In 1917 appointed Member of the Electric Power Supply Committee of the Board of Trade, and in 1919 Chief Electricity Commissioner

(Designate), in which capacity he undertook the piloting of the "Electricity (Supply) Bill" through both Houses of Parliament. To fill this capacity he resigned his consulting practice and position in his late firm. Address: Wey Barton, Blyfleet, Surrey.

Solari, Marquis Luigi.—Cavaliere Ufficiale della Corona d'Italia, Cavaliere dei SS. Maurizio e Lazzaro, Commendatore di Danilo, and Cavaliere of St. Anna. Received decorations of bronze medals for the campaigns of China and Africa. —B. in Turin. Was appointed officer of the Italian Royal Navy in 1890. Obtained the diploma of Electrical Engineer at the University of Turin in 1898. In 1900 placed in charge of the Laboratory of Wireless Telegraphy at the Royal Dockyard of Spezia. In 1902 took charge of the wireless telegraph station on the Italian warship "Carlo Alberto" during the historic experiments on that vessel conducted by Senatore Marconi. In 1903 delegate of the Italian Government to the Berlin Wireless Conference. In 1904-05 supervised the Wireless Telegraph Department of the Italian Ministry of Posts and Telegraphs. Official delegate of the Italian Government at the International Congress of Electricity held at St. Louis, U.S.A., in 1904. Joint inventor with Professor Lori, of the Padua University, of a magnetic relay. Has published several papers on wireless telegraphy in various periodicals and reviews. Since 1906 has devoted himself to the development of the Marconi system in Italy. Address: Via Maria Adelaide, 8, Rome (Italy).

Squier, Major-General Sir George Owen, K.C.M.G., Ph.D.—Chief Signal Officer U.S. Army. Formerly military attaché to the American Embassy in London. Educ. Johns Hopkins University, Baltimore. Grad. Doctor of Physics 1893. Research student under the late Professor Rowland and in the laboratory of the late Sir William Preece at the British General Post Office. Discovered the use of living trees as a means of receiving wireless messages 1904, and published a paper entitled "The Absorption of Electro-Magnetic Waves by Living Vegetable Organisms." On June 28th, 1911, an important treatise by him, dealing with multiplex telephony and telegraphy by means of waves guided by wires, was read before the American Institute of Electrical Engineers. Author of numerous papers on the subject of wireless telegraphy and has devoted special attention to the use of wireless telegraphy in military operations. Awarded the Elliott Cresson Gold Medal for his researches in multiplex telephony, 1912. Presented a paper on "Cable Telegraphy" to the Physical Society of London, June, 1915, advocating the adaptation of Wireless Engineering methods to ocean cables. Author of "Tree Telephony and Telegraphy." Member of National Academy of Sciences, 1919. Awarded the Franklin Medal, by the Franklin Institute of Philadelphia, Pa., 1919. Awarded the Distinguished Service Medal, United States Army, 1919. Address: War Department, Washington, D.C., U.S.A.

Stanley, Rupert, Principal Municipal Technical Institute, Belfast. Chevalier of the Legion of Honour.—B. in Ireland, 1876. Educ. Irish schools and universities. Joined technical staff of the Isle of Thanet Electrical Light and Power Company in 1899, and two years later appointed Lecturer in Physics and Electrical Engineering at the Brighton School of Science and Technology. Returned to Belfast in 1903 as Professor of Physics and Electricity at Belfast Municipal Institute. Member of the Institution of Electrical Engineers. In 1914 undertook the pre-

paration of a "Textbook of Wireless Telegraphy," which has become a standard textbook on the subject, both at home and in America, and is now published in two volumes, of which the second deals exclusively with valves and valve apparatus. Started war service as second in command of a Field Company in the Ulster Division, but was soon transferred to radio-telegraph work, and served in France from October, 1915, to April, 1918, where he became Chief Wireless Instructor to the B.E.F. Address: Municipal Technical Institute, Belfast.

Stone Stone, John.—Studied electricity, chemistry, physics and mathematics at Columbia University and Johns Hopkins University. Experimentalist in research laboratory, American Bell Telephone Company, 1890-99. Made some investigations in telephony without wires, 1892. Consulting Electrical Engineer and expert for the Ladd Wireless Telephone Syndicate, experimenting on directional signalling, 1899. Retained in 1900 by the Stone Wireless Telephone Syndicate, and in 1902 when the Stone Telegraph and Telephone Company was organised. Author of many scientific papers on wireless. Granted more than 100 U.S. patents in the radio field and a correspondingly large number of foreign patents. Fellow, American Academy of Arts and Sciences. Fellow, American Association of Advanced Science. Fellow and Past-President Institute of Radio Engineers. Member or Associate of the following societies: American Institute of Electrical Engineers. American Electro-Chemical Society, U.S. Navy Institute, Franklin Institute, Mathematics and Physics Club, Boston Scientific Society. His investigations have been principally directed along the lines of eliminating interference in wireless telegraphy.

Swinburne, James, F.R.S.—B. Inverness, February 28th, 1858. Educ. Clifton College. Employed by Messrs. J. W. Swan and Co. (1881) to organise their lamp factory in Paris; later he went on a similar mission to America. Consulting Engineer since 1894, and has attained considerable eminence in various branches of science. As an expert on wireless telegraphy his fame has been recognised by the Government. Member of the Technical Committees considering the Imperial Wireless Scheme, 1912 and 1919-20. Member of various scientific societies, and is on the Council of some. President of the Institution of Electrical Engineers, 1902-3. Addresses: 82, Victoria Street, S.W.1.; Woodhurst, Oxted, Surrey.

Swinton, Alan A. Campbell, F.R.S., M.Inst.C.E., M.I.E.E., M.I.M.E., President of the Wireless Society of London.—B. Scotland, 1863. Opened career in 1882 at the Armstrong Works, Elswick. Consulting electrical engineer in London since 1887, having been responsible for the carrying out of many large electrical installations. Chairman of Crompton & Co., Ltd., and director of several electricity supply and engineering manufacturing companies. Associated with the development of the Parsons turbine and other important inventions. Chairman of the Council of the Royal Society of Arts; Chairman of the British Scientific Instruments Research Association; a Member of the Executive Committee of the Board of the National Physical Laboratory; Past President of the Röntgen Society. Member of the Executive Committee of British Science Guild; a Manager of the R. Institution of Great Britain (1912-15). Member of Sub-committee "B" on Atmospherics of Radio Research Board of the Department of Scientific and Industrial Research. Has devoted considerable attention to scientific research, including

wireless telegraphy. Address: 66, Victoria Street, Westminster, S.W.1.

Talor, D. Jose, Col., Spanish Royal Engineers, Director of the Centro Electrotécnico y de Comunicaciones, Madrid. Has the full control of the Wireless Services in the Spanish Army. A member of the Spanish permanent Radiotelegraph Commission. One of the chief contributors of military as well as civil wireless in Spain.

Tesla, Nikola.—B. Smilian, Sika, Dalmatia, 1857. One of the foremost of the world's electricians. Quite early in life he began to take delight in arithmetic and physics. Graduated Carlstadt, 1873. Devoted his energy to electrical studies and investigations. Went to Graz, where, at the Polytechnic School, he prepared for work as professor in mathematics and physics. Whilst there he was so struck with the objections to the use of commutators and brushes that he made up his mind to remedy that defect in dynamo electric machines. Visited America about 1882, where he captured the attention of the whole world with his fascinating experiments on high-frequency electric currents. Since 1890 devoted himself almost entirely to studies of alternating currents of high frequency and very high potentials.

Thornblad, Thor, Lieut., R. Swedish Engineers.—B. Upsala, Sweden, June 10th, 1885. Pioneer of Wireless Telegraphy in Sweden. His interest in the theory and practice of wireless dates from 1899. Author of the first great Swedish standard work on Wireless Telegraphy, "Trådlösa Telegrafer," published 1911. Passed his examination as student at the High School of Stockholm, 1904. Entered the Royal Engineers as Cadet, 1904. Commissioned 1906. Studied mathematics, physics and chemistry 1906-10, first at the Technological Academy of Stockholm, later at the University of Stockholm. By command of the Swedish Government studied Wireless Telegraphy in foreign countries. Devoted considerable attention to the use of wireless on aircraft. Author of a number of articles on radiotelegraphy in the scientific and daily press. Knight of the Order of the Crown of Italy. Address: Stråndvägen 7, Stockholm.

Todd, David Wooster, Captain, U.S. Navy, At present in command of the Flagship "Pittsburgh" in European waters.—B. Round Valley, California, June 29th 1874. Educ. private and public schools in Mich., Nev., and San Francisco. Appointed to Naval Academy, 1891, graduated in June, 1895. Has served at sea on the following vessels of the United States Navy: "Constellation," "Monongahela," "Olympia," "Oregon," "Wheeling," "Rainbow," "Chicago," "Iowa," "Newark," "Denver," "Monterey," "Concord," "Galveston," "Wyoming," "Dixie"; has served ashore as instructor in ordnance, Naval Academy; in charge of Radio Division of Bureau of Steam Engineering, Navy Department, and as Assistant Superintendent of the Radio Service. Attended International Radio-Telegraphic Conference, London, 1912, as a delegate. Director Naval Communications, August 3rd, 1916, succeeding Capt. (now Rear-Admiral) W. H. G. Bullard, U.S. Navy. Attended Inter-Allied Radio Conference in Paris upon United States entry into European War, and subsequently organised the American end of the Inter-Allied Transatlantic Radio System. Also organised and directed the United States Cable Censorship, and served on the Censorship Board as Chief

Cable Censor. Address: U.S.S. Pittsburgh, c.o. Postmaster, New York.

Torikata, Dr. Wichi.—B. Japan, 1883. Trained to the profession of Electrical Engineering in the Engineering College of Tokyo Imperial University. Graduated 1906. Devoted himself to the close study of Radiotelegraphy and Telephony, acting at one time as Assistant Engineer to Dr. Osuke Asano, ex-Director of the Electro-Technical Laboratory, and also as Chief Engineer of the wireless section. Inventor and patentee of the Koseki or Mineral Detectors, the T.Y.K. Oscillation Gap for use in Radiotelephony, and the Wave Telephony superposed on electric power transmission line. The late Mikado of Japan recognised his services by awarding him the Fifth Degree of Decoration, bestowing this honour specifically for his services in connection with Wireless Detectors, whilst the Ruling Emperor has presented him with the Fourth Degree of Decoration on account of his Radio Researches. The Senate of Tokyo University marked their appreciation of his efforts by bestowing upon him in 1915 the title of "Dr. Engineer." Has received many prizes for technical work, including the First Medal of the Japanese Electric Engineers' Society (established 1888), and Academy Prize and Medal granted by the Japanese Imperial Academy. He took his position after the resignation of Dr. M. Torigawa, ex-Director. Address: No. 2801 Sanno, Omori, near Tokyo.

Travailleur, Maurice.—B. Brussels, 1871. Graduated as engineer at Brussels University, 1893. Appointed Electrical Engineer to the late King of the Belgians, 1897. One of the founders of Internationale Société Anonyme, the Marconi International Marine Communication Co., Ltd., and Managing Director of the Télégraphie sans Fil.

Tsiang Tseng-yi.—Native of the Haining District of the Chekiang Province. Acquired the third degree of Literature at the Metropolitan Examination in Peking, 1904, and appointed Junior Clerk of the Board of Revenues. Soon afterwards transferred in the same rank to the Board of Communications (then known as Yuchuanpu) by its special recommendation for dealing with telegraph matters. Chinese telegraphs were then administered partly by a commercial company and partly by the provincial viceroys and governors. Mr. Tsiang proposed that all the commercially and provincially owned telegraph lines be nationalised and placed under the direct control of the Yuchuanpu. This proposal received the approval of the Government, and was put into operation. In 1911, as Commissioner of Telegraphs of the Yuchuanpu, he caused two powerful radio stations to be established, one in Peking and the other at Nankin. Since their establishment the wireless service has been greatly improved and extended to such localities as Shanghai, Woosung, Foochow, and Canton, along the coasts, and Kalgan and Wuchang in the interior. Both the Ministries of War and Navy have followed in the steps of the Ministry of Communications by installing radio stations for their respective purposes. Mr. Tsiang served over ten years in the telegraph service, holding the following important positions: 1910-11, Commissioner of Telegraphs of the Yuchuanpu; 1913-16, Chief of the Financial Department of Telegraphs, Posts and Navigation. Acted as Chief of the Telegraph Department and Director-General of Telegraphs of the Ministry of Communications, and Chairman of the Chinese Society of Electrical Science.

Turner, Laurence Beddome, M.A., M.I.E.E.—B. 1886. Educ. Bedford Grammar School and King's College, Cambridge (1904). First-class honours in Mechanical Sciences Tripos in 1907. Spent 1907-08 in research work at the C.U. Engineering Laboratory, receiving in 1908 the award of the University "John Winbolt Prize" for an essay on this research. After a year in the workshops and drawing office of Messrs. Siemens Bros. at Woolwich and Siemens u. Halske A.G. at Berlin, entered in 1910 the Engineer-in-Chief's office of the G.P.O. Engaged there in W/T experimental work, and in the design and installation of new ship-and-shore stations. Attached to the Army Signals Experimental Establishment at Woolwich 1916, where he designed wireless field apparatus, including the Infantry "Loop Set." Fellow and Lecturer of King's College, Cambridge, 1919. Member of the Imperial Wireless Telegraphy Committee, 1919. Address: King's College, Cambridge.

Turner, Samuel, A.M.I.E.E., A.F.A.C.S., A.F.Aer.S., M.I.Radio.E.—Educ. Barrow-in-Furness Sec. and Tech. Coll., under G. Grace, D.Sc., etc. Two years' works training at Messrs. Vickers, Maxim, Barrow. Appointed to post in Telephone Research Labs., London. Subjects included Telephony and Telegraphy, Valves and Valve Circuits, Telephone Transmission, High-Frequency Measurements, Automatic Telephony, etc. Lecturer and Instructor to R.F.C. W/T Officers at Brooklands (under Major Prince) in W/Telegraphy and Telephony applied to Aircraft December, 1915—Oct., 1917. Research work in W/Telephony, C.W., etc. (using Triode valves) at R.F.C. W/T Exper. Station, Biggin Hill and Woolwich (1917-18). Transferred to Air Ministry to develop and supervise Technical Section. Resumed civilian research work July, 1919. Inventions: Devices for W/Target Training of Pilots, Observers, etc. Publications: Papers (London Telephone Society). Articles: "Electrician" (and other papers), and I.C.S.; Textbook on Automatic Telephony, etc. Address: 31, Belsize Square, N.W.3.

Turpain, Professor Albert.—B. La Rochelle, December 2nd, 1867. Employed in the Department of Posts and Telegraphs of France, 1884-87. Licentiate in physical science, 1888. Licentiate in mathematics, 1891. Obtained doctorate of science, 1889. As tutor of physics at the Faculty of Science, Bordeaux, succeeded in sending messages without wires from an equipment erected in the college buildings. Has experimented in wireless telegraphy with successful results since 1894. Applied himself to the question of tuning and (1899) experimented with a means for determining the direction of electromagnetic waves. Resumed these experiments 1912. Succeeded in obtaining graphic records of time signals by means of a micro-ammeter over a distance of 300 km. between Poitiers and Paris, 1911. Carried out successful experiments in photographically recording wireless telegraph signals which passed between Paris and Poitiers.

Vallauri, Giancarlo.—B. Rome, 1882. Educ. in the classical schools of Italy. Entered the Royal Naval Academy. Appointed officer of the Royal Italian Navy, 1903. After a few years at sea he quitted the active naval service and joined the Polytechnic School in Naples, obtaining the diploma of engineer and the electro-technic diploma, 1907. Since conducted electrical tuition in the Polytechnic Schools of Padua, Karlsruhe and Naples. Connected with many industrial electric establishments and placed his services at the disposal of the Royal Navy

for the installation of wireless stations. inaugurated at the Polytechnic School in Naples a course in Wireless Telegraphy 1912, and supervised that subject till the end of 1916, when he was called to the direction of the Institute of Electricity and Wireless Telegraphy of the Royal Navy by the Royal Naval Academy in Leghorn. His attention has mainly been turned to the study of ferro-magnetic phenomena, to which he has made important contributions. Has published a series of papers on Ionic Valves, which has won wide publicity and appreciation. Address: R. Accademia Navale, Leghorn, Italy.

Van der Bijl, Dr. H. J.—Scientific and Technical Adviser Bureau of Mines and Industries, Union of South Africa. Educ. Victoria College, British South Africa, and University of Leipzig, where he gained his doctorate. Visited United States, 1912, and joined Engineering Department, Western Electric Company. Instrumental in devising several improvements in Telephone and Telegraph instruments. Figured prominently in the development of the Vacuum Tube and ranks among the leading authorities on thermionics. Address: Scientific and Technical Adviser, Bureau of Mines and Industries, Pretoria, S.A.

Van der Pol, Balth, Jun., Director of Physical Research Laboratory, Teyler's Institute (Haarlem).—B. January 27th, 1889, at Utrecht (Holland). Educ. at Utrecht, graduating as *Candidaat* in the University (1914), and as *Doctorandus* (1916). Studied Experimental and Theoretical Physics, under Professors Julius and Ornstein. His interest in the theory and practice of wireless dates from 1904. Came to England in 1916 to study under Professor J. A. Fleming. Proceeded to Cambridge in 1917, working under Professor Sir J. J. Thompson, at the Cavendish Laboratory for about eighteen months. He is author of a number of valuable monographs upon physical and radiotelegraphic subjects. Appointed Conservator and placed in charge of the physical research laboratory of Teyler's Institute, Haarlem (Holland). He is now engaged on research work there with Professor H. A. Lorentz. Address: Physical Laboratory, Teyler's Institute, Haarlem, Holland.

Vanni, Dr. Giuseppe.—B. Albano Laziale (Rome) in 1862. Graduated in science 1887. Went to Strassburg 1890, where, under Professor Kohlrausch, of the Physical Institute, he studied electrical measurements. Appointed to teach physics at the Collegio Romano, Rome, 1894. Nominated professor and director of the physical laboratory of the Military Radiotelegraphic Institute in Rome, 1912. Took part in the International Radiotelegraphic Conference of London, 1912, as a member of the Italian delegation, and also at the Conferences held in Paris in 1912 and 1913. His works are principally concerned with electrolgy, electrical engineering, and electrical waves. By means of an hydraulic microphone of his invention made interesting experiments in wireless telephony between Rome and Tripoli (1,000 km.) and between Rome and Treviso (420 km.), and in 1914 his paper on the "Progress and Actual State of Wireless Telegraphy and Telephony" gained the Cagnola Prize of the Royal Lombard Institute of Science and Literature in Milan. Address: Rome, Military Radiotelegraphic Institute, Viale Mazzini 10.

Vvyan, R. N.—Educ. at Charterhouse. Received electrical and engineering training Faraday House. Joined Marconi's Wireless Telegraphy Co., 1900. Built Poldhu Wireless Station, subsequently proceeding to Canada as

Managing Engineer until 1908. In the course of his work visited most European countries and also South Africa and America. Responsible for design and construction of most of the high-power stations erected by the Marconi Company, including naval strategic stations and others erected for the Admiralty early in the late war. Joined R.F.C., 1916, and served in France. Later sent to America as member of the British War Mission. Demobilised early 1919, since when Superintending Engineer of the Marconi Company. In charge of the design, construction and management of all fixed wireless stations owned or erected by that company.

Wade, C. F. Newton, A.M.I.Rad.E., Postmaster-General and Superintendent of Land and Radio Telegraphs, British North Borneo.—B. Shepton Mallet, Somerset. Five years with Messrs. Siemens Bros. & Co., at Woolwich, as Radio Engineer, during which time he was employed on extensive experiments on earth telegraphy, earthed and buried aerials and transmission of high-frequency currents along wires, in addition to ordinary experimental, designing and testing work in connection with Radio apparatus. Superintendent of Government Radiotelegraphs, British North Borneo, 1918. Postmaster-General and Superintendent of Land Telegraphs in addition in January, 1920. Address: Jesselton, British North Borneo, and Intake, Sheffield, Yorks.

Walter, L. H., M.A., A.M.I.E.E.—B. London, 1870. Educ. private schools in England, at Hanover, Germany, Trinity College, Cambridge (1894-98), where he took honours in Natural Sciences. Later carried out research work in the University Engineering Laboratory. Experimental assistant to Sir Hiram S. Maxim. Editor of "Science Abstracts," 1903, when that publication was taken over by the Institution of Electrical Engineers, which position he still holds. Inventor of several forms of detectors of electrical oscillations, and for his magnetic type of oscillation galvanometer was awarded the John Scott Medal. In 1905 he drew attention to the advantages of directive wireless telegraphy and, associating himself with Captain Tosi and Dr. Bellini, he introduced the directive system and the wireless compass into England. Address: Institution of Electrical Engineers, 1, Albemarle Street, W.1, and 23, Park Mansions, Battersea Park, S.W.11.

Weagant, Roy A.—B. Morrisburg, Ontario, Canada, 1881. Educ. Stanstead College, Stanstead, Quebec, Canada, and McGill University, Montreal, Canada. Graduated from Electrical Engineering Course, 1905. Studied Physics under Sir Ernest Rutherford and first became interested in wireless through witnessing some of his experiments in Hertzian waves. Gained engineering experience with the Montreal Light, Heat, and Power Company, the Westinghouse Electric Manufacturing Company of Pittsburgh, Pa., and the De LaVal Steam Turbine Company. Took up commercial wireless work in 1908. Entered service of the Marconi Wireless Telegraph Company of America, 1912, where he soon rose to the position of Chief Engineer. Appointed, 1920, Consulting Engineer, Radio Corporation of America. Fellow of the Institute of Radio Engineers and former member of its Board of Directors and Standardisation Committee. Inventor of a novel method of eliminating static interference. Awarded Liebmann Memorial Prize for 1920. Address: Douglas Manor, Long Island, New York.

Whiddington, Richard, M.A., D.Sc., Professor of Physics, University of Leeds.—B. November

25th, 1885, in London. Educ. at St. John's College, Cambridge, where after taking degree in 1908 he undertook research work under Professor Sir J. J. Thomson at the Cavendish Laboratory. Elected Fellow of St. John's College, 1911. In September, 1914, went to Royal Aircraft Factory, Farnborough, to design aircraft wireless apparatus for the Flying Corps. Received first commission in Army in 1915, leaving Farnborough soon after. During the war designed a number of the standard R.A.F. wireless sets and assisted on the W.T. Board and Inter-Allied W.T. Commission in Paris. Demobilised with rank of major, June, 1919. Has published a number of original papers on various electrical subjects. Member of Subcommittee "D" on Thermionic Valves, of Radio Research Board, of the Department of Scientific and Industrial Research. Address: Leeds University.

Whitmore, G. Scovell.—B. Dawlish, 1881. Educ. St. Andrew's College, Dublin. Served under Eastern Telegraph Company, Ltd., at Porthcurnow and Malta cable stations. Entered Heaton works of Sir C. A. Parsons & Co., 1902, and became Chief Assistant to the Engr. and Gen. Manager of Northern Counties Electricity Supply Co., Ltd., in 1906. Joined the engineering staff of Marconi's Wireless Telegraph Co., Ltd. (1909), and appointed (1910) Managing Engr. at the Transatlantic W.T. Station, Glace Bay, Canada. Since 1912 employed at the head office of Marconi's Wireless Telegraph Co., Ltd., mainly in connection with the construction and maintenance of high-power W.T. stations, occupying the position of Act. Suptdng. Engr. August, 1916—March, 1919, during absence of the Suptdng. Engr. on military service.

Wibier, Major Albert.—B. Renaix, East Flanders, June 3rd, 1876. Early turned his attention to wireless. Installed and organised network of wireless communication in Belgian Congo. Now Director-General, Congolese Wireless Service at Brussels. Address: 2, rue de l'Esplanade, Brussels, Belgium.

Wien, Professor Max.—B. Königsberg, 1866. Made a special study of the subject of physics under Helmholtz and others, and assisted Röntgen, 1891-93. Devoted considerable attention to the study of electro-magnetic waves and their propagation, and was the originator of the quenched spark.

Wilson, Brig.-Gen. Samuel Herbert, C.B. (1918), **C.M.G.** (1914); Officier Legion d'Honneur; French Croix de Guerre; Commandeur de la Couronne, Belgium; Belgian Croix de Guerre.—B. 1873. Entered Army, R.E., 1893. Captain 1904, Major 1913, Bt. Lt.-Col. 1916. Bt. Col. 1917. Served S. Africa, 1899-1900 (Queens' Medal with two clasps). Served great war, 1914-18; General Staff Officer, 2nd Grade, 1911-15; General Staff Officer, 1st Grade, 1915-16; Brig.-Gen. General Staff, 1916. Principal Assistant Secretary, Committee of Imperial Defence and Head of Imperial External and Defence Branch Cabinet Secretariat. Secretary Imperial Communications Committee; Wireless Telegraphy Committee; Overseas Defence Committee; Home Ports Defence Committee. Address: 22, Stanford Road, Kensington, W.8. (Tel. 5049 Western); and Heath Cottage, Puttenham, Surrey.

Yagi, Professor Hideo., Professor of Electrical Engineering at the Tohoku Imperial University and member of the Institute of Radio Engineers.—B. Osaka, January, 1886. Graduated from the Tokyo Imperial University, 1909. Lecturer and later Professor of Electrical Engineering

at the Sendai Higher School. Studied in Dresden, London, and Harvard, 1913-16, engaging at the same time in several researches on radic frequency phenomena. Author of many scientific papers.

Yokoyama, Eitaro, Director of Electro-Technical Laboratory in Japanese Department of Communications.—B. 1883. Graduated Engineering College of the Tokyo Imperial University, 1908. Radio Engineer to Ministry of Communications, Japan. Engages in radio researches at the Electro-Technical Laboratory of the Ministry. One of the inventors of T.Y.K. Oscillation Gaps of Radiotelephony. Awarded by the Ruling Emperor with the Fifth Degree of Decoration. Granted many prizes for his wireless investigations and inventions, including the Academy Prize and Medal of Japanese Imperial Academy. Proceeded to America and Europe to study, 1916. Returned to Japan, 1918, and resumed service at the same Laboratory. Promoted to the Head of the Radio Section of the Laboratory, 1920. Holds additional posts as Engineer to the Formosan Government and Lecturer of the Tokyo Higher

Technical School. Private address : Kiharayama 1523, Omori, Tokyo.

Zenneck, Professor, Dr. J., Professor of Experimental Physics at Technical College, Munich.—B. April 15th, 1871, in Würtemberg. Studied for four years in a Theological College at Tübingen. Abandoning theology, studied mathematics and natural history, particularly zoology, 1889-94. Passed the State examination in these subjects, 1894. Obtained his doctorate, 1894. Studied natural history in London and elsewhere. Subsequently devoted himself entirely to physics. Assistant in the Physical Institute in Strassburg, 1895-99. Engaged in making tests with wireless telegraphy in the North Sea, 1899-1900. Lecturer, Assistant Professor of Physics in the Technical College, Dantzig, 1905 and 1911. Professor of Physics at the Technical College, Brunswick, 1906. Joined one of the largest chemical works in Germany, 1909. Professor of Physics at the Institute of Technology, Munich, 1913. During part of the war Technical Adviser to the Atlantic Communication Co., which then operated Sayville wireless station. Address : Technische Hochschule, München, Germany.

OBITUARY.

SINCE we went to Press with our last edition, the world of wireless has had to mourn the loss of some prominent men.

* * * * *

We regret to have to record the death at Bologna, Italy, on June 8th, 1920, at the age of 70 years, of **PROFESSOR AUGUSTO RIGHI**. Born in the city in which he died, in 1850, he was educated at the University there. He was Professor of Physics at Bologna Technical Institute from 1873 to 1880, at Palermo University 1880-1885, at Padua University 1885-1889, and at Bologna University from 1890 until his death. From 1872 to 1918 he published 234 original papers in Scientific Periodicals, many of which have been translated into French, English, German and Russian. He is the author of several books which he published from time to time. Professor Righi represented the Italian Government as its Plenipotentiary at the International Time Congress of Paris, 1912-1913, and also at the International Congress of Radiotelegraphy and Electricity held in Brussels in 1910. His death leaves a wide gap in the ranks of Radio Scientists.

On December 5th, 1920, **MR. H. J. NIERSTRASZ**, Inspector of the Coast and Ship Wireless Telegraph Service of Holland, departed this life in his fifty-seventh year. Born April 11th, 1864, he was one of the pioneers of wireless telegraphy in Holland and for his services was created a Knight of the Oranje-Nassau Order. For several years he ably filled the important post of Chief of the Technical Wireless Staff of the Dutch Government. In his early years he conducted experiments between The Hague and Rotterdam (1900) and by the results obtained he was encouraged to continue his investigations. In his official capacity Mr. Nierstrasz was a delegate at the International Radio Telegraph Conferences of London and Berlin, and was also present at the Conference on the safety of Life at Sea held in London in 1914.

DR. ALEXANDER MUIRHEAD, F.R.S., who died at the Lodge, Shortlands, Kent, on December 13th, 1920, aged 72, was associated with Sir Oliver Lodge in the latter's pioneer work in connection with wireless telegraphy. Some two years before Marconi took out his patents, Sir Oliver lectured on Hertzian waves at the Royal Institution, and Dr. Muirhead, who was present, suggested to the lecturer that what he had said might be applied to the science of telegraphy. The result was their valuable collaboration.

LITERATURE

: SECTION :

**(A) New Radio Books and Periodicals
published in 1920**

**(B) Résumé of Articles published
in 1920**

**(C) Standard Publications on
Wireless :—**

(i) Books.

(ii) Periodicals.

LITERATURE OF WIRELESS TELEGRAPHY AND TELEPHONY

THE literature of radiotelegraphy and telephony increases year by year, and has now reached the stage when we consider that our readers will find it useful to have a record of the various items which have appeared during the past year, not merely in the shape of books, but also of periodical publications. The *résumé* which finds a place below covers only the more important of such items as deal directly with the subject of this volume; for works and papers on the more general subjects we must refer readers elsewhere.

(A) NEW BOOKS DEALING WITH WIRELESS PUBLISHED DURING 1920.

- La Télégraphie sans fil au Congo Belge.** R. B. Goldschmidt and R. Brailard. [Brussels: *M. Hayez*, Imprimeur de l'Académie Royale de Belgique. Pp. 120.]
- Selected Studies in Elementary Physics :** A Handbook for the Wireless Student and Amateur. E. Blake, A.M.I.E.E. [London: *The Wireless Press, Ltd.* Pp. viii+176. Price 5s. net.]
- Wireless Telegraphy.** W. H. Marchant. [London: *Sir Isaac Pitman & Sons, Ltd.* Second edition. Pp. ix+305. Price 7s. 6d. net.]
- La Telefonia senza Filo.** Umberto Bianchi. [Milan: *Ulrico Hoepli.* Pp. viii+296. Price L.10.]
- Radio Engineering Principles.** H. Lauer, B.S., and H. L. Brown, B.E.E. [New York: *McGraw-Hill Book Co. Inc.* London: *McGraw-Hill Publishing Co., Ltd.* Pp. xv+300. Price 21s. net.]
- Wireless Telegraphy and Telephony :** First Principles, Present Practice and Testing. H. M. Dowsett, M.I.E.E. [London: *The Wireless Press, Ltd.* Pp. xxxi+331. Price 9s. net.]
- Electric Oscillations and Electric Waves.** G. W. Pierce. [New York: *McGraw-Hill Book Co. Inc.* London: *McGraw-Hill Publishing Co., Ltd.* Pp. ix+517. Price 30s. net.]
- Grundriss der Funken-Telegraphie in Gemeinverständlicher Darstellung.** Dr. Franz Fuchs. [Munich: *R. Oldenbourg.* Eleventh edition. Pp. 73. Price 2.75M.]
- The How and Why of Radio Apparatus.** H. W. Secor. [New York: *Experimenter Publishing Co. Inc.* Pp. 160. Price \$1.75.]
- Etude de Quelques Problemes de Radiotélégraphie.** H. de Bellescize. [Paris: *Gauthier-Villars et Cie.* Pp. 174. Price 16 fr.]
- Eléments de Télégraphie sans fil pratique.** F. Duroquier. [Paris: *H. Dunod.* Second edition. Pp. 130. Price 7 fr.]
- Radiotélégraphie pratique et Radiotéléphonie.** P. Maurer. [Paris: *H. Dunod.* Pp. 386. Price 21 fr.]
- Introduction à la Théorie des Courants Téléphoniques et de la Radiotélégraphie.** J. B. Pomey. [Paris: *Gauthier-Villars et Cie.* Pp. xiv+510. Price 50 fr.]

- Elements of Radiotelegraphy.** E. W. Stone, M.Inst.R.E. [New York: *D. van Nostrand Co.* London: *Crosby, Lockwood & Son.* Pp. vii+267. Price 16s. 6d. net.]
- Vocabulaire en Cinq Langues.** H. Viard. [Paris: *Gauthier-Villars et Cie.* Pp. x+108. Price 15.00 fr.]
- The Consolidated Radio Call Book.** [New York: *The Consolidated Radio Call Book Co. Inc.* Second edition. Pp. 160. Price \$1.25.]
- Practical Amateur Wireless Stations.** J. A. White. [New York: *The Wireless Press Inc.* Pp. 133. Price 5s. net.]

NEW RADIO PERIODICALS STARTED DURING 1920.

- Radioélectricité.** [Paris: *Société de Publications Radio-techniques.*] Price 3 fr. Monthly.
- La T.S.F. Moderne.** [Paris: *La T.S.F. Moderne.*] Price 3.50 fr. Monthly.
- Tijdschrift van het Nederlandsch Radiogenootschap.** [Baarn, Holland: Published by the *Nederlandsch Radiogenootschap*, Oude Utrechtseweg. 8.]

(B) RÉSUMÉ OF ARTICLES PUBLISHED DURING 1920

A complete list of all articles dealing with wireless would occupy too much space in a volume of this character. A review of radio literature is now being issued monthly in the pages of *The Radio Review*, so that a complete list of such articles as are published month by month, with abstracts of their contents, is now available. The following list, therefore, merely contains references to the most important only of the technical articles that have appeared during the past year. These are roughly classified under separate headings, but it should be noted that in many cases articles may refer to more than one branch of the subject. This is particularly the case with articles dealing with valves, which have applications in almost every branch of radio work.

RADIO FREQUENCY MEASUREMENTS AND THEORY.

- Damped Oscillations in Coupled Circuits.** G. Bramwell Ehrenborg. [*Radio Review*, 1, pp. 220-224, February, 1920; pp. 329-336, April, 1920; and pp. 375-380, May, 1920.]
- The High-Frequency Resistance of Wires and Coils.** G. W. O. Howe. [*Journal of the Institution of Electrical Engineers*, 58, pp. 152-170, February, 1920.]
- The Mandelstam Method of Absolute Measurement of Frequency of Electrical Oscillations.** J. Tykocinski-Tykociner. [*Philosophical Magazine*, 39, pp. 289-294, March, 1920.]
- The Calculation of the Self-Inductance of Multi-Layer Coils.** A. Esau. [*Jahrbuch der Drahtlosen Telegraphie*, 15, pp. 2-26, January, 1920.]
- Measurement and Comparison of Signal Intensities in Wireless Receivers.** H. de Bellescize. [*Revue Générale de l'Électricité*, 7, pp. 325-328, March 7th, 1920.]
- Refraction of Electric Waves.** T. L. Eckersley. [*Radio Review*, 1, pp. 421-428, June, 1920.]
- Recording Oscillographs and Amplifiers of Extremely Low Frequency: their Application to the Recording of Radiotelegraphic Signals.** H. Abraham and E. Bloch. [*Revue Générale de l'Électricité*, 7, pp. 211-222; pp. 255-272, February 14th and 21st, 1920.]

- On the Period and Decrement of an Oscillatory Electrical Circuit provided with a Short-circuited Secondary.** I. Jones. [*Philosophical Magazine*, 39, pp. 553-565, May, 1920.]
- Measurement of Received Radio Currents with the Electrometer.** E. O. Hulbert and G. Breit. [*Physical Review*, 15, pp. 405-408, May, 1920.]
- Some Laboratory Uses for the Contact Rectifier.** J. C. Jensen. [*Physical Review*, 15, pp. 224-225, March, 1920.]
- An Undamped Wave Method of Determining Dielectric Constants of Liquids.** W. H. Hyslop and A. P. Carman. [*Physical Review*, 15, pp. 243-244, March, 1920.]
- Conductivity and Dielectric Co-efficient of Dielectrics at High Frequencies.** G. E. Bairsto. [*Proceedings of the Royal Society*, 96A, pp. 363-382, January 2nd, 1920.]
- The Behaviour of Hertzian Gratings.** R. Gans. [*Annalen der Physik*, 61, pp. 447-464, March 3rd, 1920.]
- On the Fundamental Formulations of Electrodynamics.** G. H. Liveness. [*Philosophical Transactions of the Royal Society*, 220A, pp. 207-245, March 17th, 1920.]
- The Scattering of Plane Electric Waves by Spheres.** T. J. I'a Bromwich. [*Philosophical Transactions of the Royal Society*, 220A, pp. 175-206, February 2nd, 1920.]
- The Diffraction of the Field by a Cylinder and its Effect on Directive Reception on Board a Ship.** Commandant René Mesny. [*Radio Review*, 1, pp. 532-540, August, 1920; and pp. 591-597, September, 1920.]
- The Efficiency of Aerials.** G. W. O. Howe. [*Radio Review*, 1, pp. 540-543, August, 1920.]
- A Beat Method of Testing the Sluggishness of Contact Detectors.** R. Ettenreich. [*Physikalische Zeitschrift*, 21, pp. 208-214, April 15th, 1920.]
- Standards of High Frequency.** A. Campbell, [*Electrician*, 84, p. 66, January 16th, 1920.]
- The Electromagnetic Plane-Wave in Two Media.** K. Uller. [*Jahrbuch Zeitschrift für drahtlose Telegraphie*, 15, pp. 123-152, February, 1920.]
- On the Absorption of Corpuscular Rays Penetrating the Terrestrial Atmosphere and following Non-Rectilinear Paths.** C. Störmer. [*Comptes Rendus*, 170, pp. 742-744, March 22nd, 1920.]
- Wireless Telegraphy and Telephony.** W. H. Eccles. [*Electrician*, 84, p. 296, March 12th, 1920.]
- Everyday Measurement of Inductance and Capacity in the Wireless Laboratory.** L. B. Turner. [*Radio Review*, 1, pp. 585-590, September, 1920.]
- The Power Required for Long-distance Transmission.** G. W. O. Howe. [*Radio Review*, 1, pp. 598-608, September, 1920.]
- On the Electrical Characteristics of Low Antennae.** R. Jaeger. [*Jahrbuch Zeitschrift für drahtlose Telegraphie*, 15, pp. 318-321, April, 1920.]
- Theory of Antenna Resistance.** W. H. Eccles. [*Electrician*, 84, p. 370, April 2nd, 1920.]
- The Skin Effect and Flux Distribution of Conductors in Proximity to Iron.** A. Press. [*Physical Review*, 15, pp. 450-453, May, 1920.]
- A Differential Method of Measuring Capacity and Inductance with a Sensibility of 2×10^{-8} .** G. Falckenberg. [*Annalen der Physik*, 61, pp. 167-172, January 15th, 1920.]
- The Length of Path of the Newtonian Luminous Radiation and the Zones of Silence in Damped Radio Signals.** G. Sagnac. [*Comptes Rendus*, 170, pp. 800-803, March 29th, 1920.]

- Measurement of the Field Strength at Leghorn of the Annapolis Signals. The Need for Further Research.** G. W. O. Howe. [*Radio Review*, 1, pp. 652-655, October, 1920.]
- Antenna Constants and the Wavelengths of Antennae.** A. Press. [*Revue Générale de l'Électricité*, 7, pp., 547-552, April 24th, 1920.]
- Measurements of the Electromagnetic Field due to an Aeroplane Transmitter.** R. Baldus and R. Hase. [*Jahrbuch Zeitschrift für drahtlose Telegraphie*, 15, pp. 354-391, May, 1920.]
- An A.C. Zero Method of Determining the Grid Sensibility of Amplifying Valves.** W. Schottky. [*Telegraphen- und Fernsprech-Technik*, 9, pp. 31-32, May, 1920.]
- The Calibration of Wavemeters by Means of Higher Harmonics.** R. von Ettenreich. [*Jahrbuch Zeitschrift für drahtlose Telegraphie*, 15, pp. 236-240, March, 1920.]
- The Capacity of Rectangular Plates and a Suggested Formula for the Capacity of Aerials.** G. W. O. Howe. [*Radio Review*, 1, pp. 710-714, November, 1920.]
- Note on Radio Frequency Measurements.** C. Englund. [*Proceedings of the Institute of Radio Engineers*, 8, pp. 326-333, August, 1920.]
- Radiation Direction Changes and Variations of Audibility.** C. Kinsley and A. Sobey. [*Proceedings of the Institute of Radio Engineers*, 8, pp. 299-325, August, 1920.]
- Measurement of the Electromagnetic Field of Waves received during Transoceanic Radio Transmission.** G. Vallauri. [*Proceedings of the Institute of Radio Engineers*, 8, pp. 286-298, August, 1920.]
- Experiments on the Filtering Out of the Harmonics from the Nauen Signals.** A. Meissner and K. W. Wagner. [*Jahrbuch Zeitschrift für drahtlose Telegraphie*, 15, pp. 200-214, March; and pp. 392-406, May, 1920.]
- Electrical Oscillation in Antennas and Induction Coils.** A. Hund. [*Proceedings of the Institute of Radio Engineers*, 8, pp. 424-430, October, 1920.]
- Quantitative Experiments with Coil Antennae in Radiotelegraphy.** L. W. Austin. [*Proceedings of the Institute of Radio Engineers*, 8, pp. 421-423, October, 1920.]
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- Methods of Measuring Electrical Resistance.** E. F. Northrup, Ph.D. [New York: *McGraw-Hill Book Co. Inc.* London: *McGraw-Hill Publishing Co.*, 6/8, Bouverie Street, E.C.4. Pp. 390. Price 24s.]
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L'Électricien. [Paris: *H. Dunod*, 47 and 49, Quai des Grands-Augustins.] 1.25 frs., fortnightly; 23 frs. per annum France; 30 frs. per annum outside France.

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"T.S.F." Revue Mensuelle de Radiotélégraphie. [Valenciennes: Edited by *G. Flayelle*, 36, Rue de Mons.] Price 2.25 frs. monthly. *Publication temporarily suspended.*

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GREAT BRITAIN.

- Electrical Industries.** [London: *Electrical Press, Ltd.*, 13/16, Fisher Street, W.C.1.] Price 2d. weekly.
- Electrical Review.** [London: *The Electrical Review, Ltd.*, 4, Ludgate Hill, E.C.4.] Price 6d. weekly.
- Electrical Times.** [London: *The Electrical Times*, Sardinia House, Sardinia Street, W.C.2.] Price, 3d. weekly.
- Electrician.** [London: *Benn Bros., Ltd.*, 8, Bouverie Street, E.C.4.] Price 1s. weekly.
- Electrics.** [London: *The Electrical Press, Ltd.*, 13/16, Fisher Street, W.C.1.] Price 4d. monthly.
- Engineering Review.** [London: *The Electrical Press, Ltd.*, 13/16, Fisher Street, W.C.1.] Price 9d. monthly.
- Nature.** [London: *Macmillan & Co., Ltd.*, St. Martin's Street, W.C.2.] Price 1s. weekly.
- Post Office Electrical Engineers' Journal.** [London: *The Electrical Review, Ltd.*, 4, Ludgate Hill, E.C.4.] Price 2s. quarterly.
- Radio Review.** [London: *The Wireless Press, Ltd.*, 12/13, Henrietta Street, W.C.2.] Price 2s. 6d. monthly; 30s. per annum.
- Technical Review.** [London: *The Technical Review, Ltd.*, 2, Central Buildings, Westminster, S.W.1.] Price 1s. weekly.
- Wireless World.** [London: *The Wireless Press, Ltd.*, 12/13, Henrietta Street, W.C.2.] Price 6d. fortnightly.

ICELAND.

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- Tijdschrift voor Electrotechniek.** [The Hague: *N. Veenstra*, Laan van Meerdevoort 30.] Published monthly. Fl. 8 per annum, Netherlands; Fl. 10 per annum, outside Netherlands.

NEW ZEALAND.

- The Katipo.** Official organ of the N.Z.P. and T. Officers' Association. Published monthly at Wellington.

SPAIN.

- Aire, Mar y Tierra.** [Madrid: *Prensa Radiotelegrafa* (S.A.), Alcala 43.] 1s. monthly.

SWITZERLAND.

- Journal Télégraphique.** [Berne: *Bureau International de l'Union Télégraphique.*] 0.6 frs. monthly; 5.40 frs. per annum; 6.00 frs. per annum, outside Switzerland.

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Electrical Review (Chicago). [Chicago : 542/53, Manadnock Block.] Published weekly. \$3 per annum (\$6 European).

Electrical World. [New York : Tenth Avenue, at 36th Street.] Weekly. 15 cents.

Everday Engineering Magazine. [New York : *Everyday Mechanics, Inc.*, 2, West 45th Street,.] 15 cents monthly; \$1.50 per annum; \$2 outside U.S.A.

General Electric Review. [Schenectady, New York : *The General Electric Co.*] Published monthly. \$2 per annum.

Journal of the American Institute of Electrical Engineers. [New York : *Published by the Institute*, 33, West 30th Street.] Published monthly. \$12 per annum.

Journal of the Franklin Institute. [Philadelphia : *Franklin Institute of the State of Pennsylvania.*] 50 cents monthly; \$5 per annum.

Journal of the Washington Academy of Sciences. [Washington : *R. L. Farie*, Treasurer, Coast and Geodetic Survey.] Twice monthly except July, August and September, when monthly, \$6 per annum.

Popular Science Monthly. [New York : 225, West 39th Street.] \$3 per annum.

Proceedings of the Institute of Radio Engineers. [New York : *The Institute of Radio Engineers*, College of the City of New York, 140th Street.] Bi-monthly. \$9.60 per annum.

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Scientific American. [New York : 233, Broadway.] \$5 per annum.

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Wireless Age. [New York : *Wireless Press, Inc.*, 326, Broadway.] 25 cents monthly; \$2.50 per annum; \$3, outside U.S.A.

AMATEUR SECTION

- (A) Amateur Wireless in the United Kingdom.**
- (B) Directory of the World's Wireless Societies.**
- (C) Amateur Call Signs in the United Kingdom.**
- (D) List of Wireless Colleges and Schools.**

AMATEUR WIRELESS IN THE UNITED KINGDOM

BY E. BLAKE, A.M.I.E.E.

FOR the first time since the fateful year of 1914 we are able to chronicle a really satisfactory record of amateur wireless activity. The year 1919 found large numbers of pre-war and would-be amateurs either still in uniform or still not firmly bedded down to civilian life, and, further, the official regulations governing the practice of private wireless had barely emerged from the war-paint laid on by D.O.R.A. Here and there, keen experimenters gifted with both faith and patience had secured temporary, informal permission to indulge in a little innocuous wireless reception, but the great bulk of those interested hardly knew what was the position, whilst the clubs, the backbone of the movement, had only in a few cases recommenced operations.

On July 24th, 1919, the Committee of the Wireless Society of London met with a view to an early resumption of the Society's meetings, and the announcement was afterwards made that the society's officials had appointed a Committee to co-operate with the Post Office in the work of sifting applications for licences. The first general meeting held since the outbreak of the war took place on October 28th, 1919, during the course of which Mr. F. Hope-Jones, the chairman of the society, broached the subject of the affiliation of the suburban and provincial clubs to that body.

At a meeting of the Wireless Society of London, held on November 26th, 1919, it was announced that the society had appointed as its official organ *The Wireless World*, which periodical has since published full reports of all the society's proceedings and assisted it to consolidate the amateur movement. At a meeting of the same society on January 29th, Mr. F. Hope-Jones reported further progress with regard to the scheme for affiliation, the idea being so sound that the wireless clubs were not slow to adopt it. The definite rules of affiliation for the year 1920 were as follows:—

- (1) That an affiliated club should pay £1 1s. per annum as subscription, and £1 1s. entrance fee.
- (2) That such a club should adopt a subtitle, "Affiliated with the Wireless Society of London."
- (3) That affiliated clubs should name each year, say in January, one member (probably the President or Hon. Secretary), who will be during the year a member of the Wireless Society of London, and to whom all notices, etc., of the Society will be sent.
- (4) That each affiliated club shall receive twelve free reprints of the Wireless Society's monthly lectures, and as many more as required at cost price plus postage.
- (5) That members of affiliated clubs be invited to attend meetings of the W.S.L. when in London, a letter of introduction being given from the Hon. Secretary of the provincial or suburban club.
- (6) That an annual conference or convention be held in London, all members of provincial or suburban clubs being invited.

The first Annual Conference of the wireless clubs of this country was held at the Royal Society of Arts, on February 27th, 1920, under

the auspices of the F.R.S.E., M.Inst.C.E., F.R.G.S., F.S.S., etc., of the Post Office, and concerning the policy of his remarks the regulations of the force. (Vide pp. 46

The history of Kingdom during point of view, but ledge evinced by training in radio period is over large first-rank amateur less than 58 clubs are affiliated with satisfactory aspect of definite research the stringency, on here, have forced of experiment w been far from h

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the auspices of the Wireless Society of London. Sir Charles Bright, F.R.S.E., M.Inst.C.E., F.R.Ae.S., M.I.Mech.E., M.I.E.E., F.I.Rad.E., F.R.G.S., F.S.S., took the chair, and Commander F. G. Loring, R.N., of the Post Office, attended in order to make a special statement concerning the policy of the authorities with regard to amateur wireless. In his remarks this gentleman foreshadowed in broad outline the regulations of the Post Office in regard thereto, which are still in force. (*Vide pp. 461 and 462.*)

The history of the amateur wireless club movement in the United Kingdom during 1920 was remarkable not only from the numerical point of view, but on account of the high standard of skill and knowledge evinced by the members. Many hundreds of men received training in radio work during the war and now that that melancholy period is over large numbers of them undoubtedly stand amongst the first-rank amateurs. At the time of writing we have records of no less than 58 clubs, all in a healthy, "going" condition, and 24 of them are affiliated with the Wireless Society of London. One of the most satisfactory aspects of contemporary club work is that it shows signs of definite research. The conditions imposed upon private radio work, the stringency, or otherwise, of which it is not my province to discuss here, have forced amateurs thoroughly to examine all the fields of experiment which they may legitimately cover, and the result has been far from barren.

Needless to say, the study of the thermionic valve is the prime favourite, whilst experiments with "loop," ground, and tree aerials, and multilayer coils are exceedingly popular. The amateur construction of apparatus has reached a very high level, special ingenuity being shown in the design of compact, portable sets. Another good sign is the conspicuous lack of enthusiasm for aimless "listening in"; the press programmes, weather bulletins and time signals are carefully and keenly observed, and the tendency all round is to deal with wireless as a science and not as a mere electrical curiosity.

Some of the clubs have been formed in connection with Y.M.C.A. centres, technical colleges, and Boy Scout organisations, with the excellent result that their activities are largely devoted to the radio education of the junior members. This wise practice, however, is not the monopoly of the clubs I have indicated, a number of the others having adopted similar methods. Another result of the club movement, and one greatly to be encouraged, is the demand for lectures. Not for a moment would I recommend the "spoon-feeding" of students in order to save them the mental discipline of systematic private study. My point is that the demand for lectures has created lecturers, and many a person who has found himself "pitchforked" into promising to read a paper before his club has learned to stand on his feet before an audience and impart knowledge in plain English.

During 1920 the amateur wireless enthusiast had numerous opportunities of experimenting with the reception of radiotelephonic speech, most notable amongst which were those occasions when Marconi's Wireless Telegraph Co., Ltd., operated their fine plant at Chelmsford. Early in the year a long test of this station was carried out and the amateurs were specially asked to report upon the "signals" they intercepted. The desired co-operation was heartily accorded and the Marconi Company afterwards sent an interesting memento of the

occasion to all who had responded to their request. Since then there have taken place the memorable performances of Dame Nellie Melba. Mr. Melchior, the Danish tenor, and the interesting communications with Senatore Marconi's yacht *Elettra* and the S.S. *Victorian*.

Just at present the amateurs are looking forward with the keenest interest to a series of tests which are to be undertaken in February, 1921, by their fellow enthusiasts in the United States. Stated briefly, the American amateur believes he can bridge the Atlantic, using a power input of no more than one kilowatt, and he is going to try it out. Hence arises the need for sympathetic co-operation on this side of the water. British amateurs in this country have no chance of developing skill in the design of long distance transmitters, a circumstance which has led them to become especially clever in reception; so that the success of the great experiment is as much in their hands as in those of the initiators of the tests, for, parodying the old saying, one may say that it takes two to make readable signals.

It is a matter for great regret that owing to the disturbed conditions at present existing in Ireland the authorities have been compelled to place a ban upon private wireless work in that country. The amateurs are well represented there and not a few professional operators have been trained there. I have excellent authority for stating that in spite of the prohibition imposed on them in the matter of practical work, the Irish radio men are keeping up their enthusiasm by studying theory and hoping with us for the speedy return of peace.

Data concerning wireless clubs will be found in the following pages.

DIRECTORY OF WIRELESS SOCIETIES

THE following list has been brought as up to date as circumstances would allow. Wireless Societies, however, are constantly being formed, and it is possible that particulars may have been received too late for insertion. Every endeavour has been made to present a thoroughly reliable list, but no responsibility can, however, be accepted for any possible inaccuracies.

AUSTRALIA.

Wireless Institute of Australia (New South Wales Division)—Pres., E. T. Fisk ; Hon. Sec., Malcolm Perry, Box 2, King Street Post Office, Sidney, N.S.W. Tels., City 7349, Randwick 93.

Wireless Institute of Australia (South Australian Division)—Adelaide : Pres., Hambly Clark ; Hon. Sec., C. E. Ames. Age limit 16 years. Annual sub., 10s. 6d., payable half-yearly. Official Organ : *Sea, Land, and Air*.

Wireless Institute of Australia (Victorian Division)—Pres., Major W. J. Sheldon ; Hon. Sec., Capt. Roach-Pierson, Melbourne, Victoria.

Wireless Institute of Australia (West Australian Division)—Pres., W. R. Coxon ; Hon. Sec., G. W. Dean, 27, Holyrood Street, West Leederville, Perth.

BELGIUM.

Cercle Belge d'études Radiotélégraphiques—Sec., M. G. de Brandner, 76, rue du Lac, Ixelles, Brussels. Official Organ, *La T.S.F. Moderne*.

CANADA.

Montreal Radio Association—Sec., D. C. Greenhill, 4171, St. Catherine Street West, Montreal. Station and Club Rooms, Wilden Bldg., Bleury Street.

Radio Club of Winnipeg—Kelvin Technical High School. Hon. Pres., J. M. F. Wilson, B.Sc. ; Pres., J. R. Foster ; Sec. and Treas., E. A. Strong, Winnipeg. Number of Scholars : 40. Apparatus : 10 in. Induction Coil, $\frac{1}{4}$ kw. Transformer, Audion Receiving Set, Arc Generator.

Regina Amateur Radio Association—Hon. Sec., H. Miller, 2226, Searle Street, Regina, Sask.

Wireless Association of Ontario—Pres., Mr. Cameron Duncan ; Sec. and Treas., Mr. F. A. Clark, 18, McMillin Avenue, Toronto.

DENMARK.

Radiotelegrafist foreningen af 1917 (Skandinavisk) Copenhagen—Car Johansgade, 14—Sec. and Treas., R. Rasmussen. Formed September 8th, 1917.

FRANCE.

Association des Anciens Radios de 8e Génie—Hon. Pres., M. le Général Ierrié ; Sec., M. Alain Boursin, 2, rue de Vienne, Paris.

Radio Club des Ardennes—Monsieur M. Thirriot, 9, Rue Bahut, Mézieres (Ardennes).

Radio Club Belfortain—Pres., Monsieur Ch. Wandres, 31, rue de Mulhouse, Belfort.

Société de Radiotélégraphie et de Preparation Militaire—Pres., Monsieur Lavigne, 152, Avenue de Wagram, Paris (XVIIe).

Société Française d'Etude de Télégraphie et de Téléphonie sans Fil—Sec., Monsieur Roussel, 12, Rue Hoche, Juvisy (Seine et Oise).

Société Française Radio Sport—Pres., R. Bourgnignon, 152, Avenue de Wagram, Paris (XVIIe).

GREECE.

Union of Greek Wireless Telegraphists, Athens.

HOLLAND.

Nederlandsch Radio Genootschap—Utrecht, Sec., Willem Barentzstraat, 8.
Nederlandsche Vereeniging voor Radiotelegrafie—Rotterdam, Sec.,
Wijnhaven, 119.

Vereeniging van Radiotelegrafisten ter Koopvaardy—Sec., J. Schuitemaker,
Jerecholaar, 74, Rotterdam.

ICELAND.

Technical Society of Iceland—Sec., Otto B. Arnar, Reykjavik.

LUXEMBOURG.

Radio Club de Luxembourg—Pres., Dr. Eng. Rod. Wicking; Sec., M. J. Wolff, 67, Avenue Baumbusch, Luxembourg. Tel., Ville 1043. Official Organ, *T.S.F., Moderne*.

NEW ZEALAND.

New Zealand Amateur Wireless Association—Prof. Fari, Canterbury College, Christchurch, New Zealand.

New Zealand Amateur Wireless Club—Sec., F. Kellegher, 83, Marine Parade, Napier.

New Zealand Wireless Institute—Sec., J. O. Taylor. Minimum age 18. Annual sub.: Full members, one guinea; students and country members, 10s. 6d. Official Organ, *Sea, Land and Air*.

SOUTH AFRICA.

Radio Society of South Africa—Hon. Sec., G. L. R. Lowe, 51, Kitchener Avenue, Bezuidenhout Valley, Johannesburg.

UNITED KINGDOM.

Wireless Society of London—Pres., A. A. Campbell Swinton; F.R.S., Sec., L. McMichael, 32, Quex Road, West Hampstead, N.W.6. Tel., Hop 1564. Official organ, *The Wireless World*.

Aberdeen and District Amateur Wireless Society—Hon. Sec., W. W. Inder, 22, Gray Street, Aberdeen.

Altrincham and District Wireless and Scientific Society (affiliated to Wireless Society of London)—Pres., Major Hamilton, M.P.; Hon. Sec., W. N. Lambert, Breeze Crest, Plane Tree Road, Hale, Cheshire. Meetings every Thursday.

Barrow and District Wireless Association—Hon. Sec., A. R. Pennington, 73, Ramsden Road, Barrow-in-Furness. Holders of Receiving and Transmitting Licences.

Birmingham Amateur Wireless Association—Hon. Sec., J. B. Tucker, "Lynwood," Ashleigh Road, Solihull, Birmingham.

Birmingham Experimental Wireless Club—Hon. Sec., A. T. Headley, 255, Galton Road, Warley, Birmingham.

Birmingham Wireless Association—Hon. Sec., for W.T., A. H. Handford, Birmingham and Midland Institute, Paradise Street, Birmingham.

Bradford Wireless Society (affiliated to Wireless Society of London)—Hon. Sec., John Bever, 85, Emm Lane, Bradford.

Brighton Radio Club (affiliated to Wireless Society of London)—Hon. Sec., D. F. Underwood, 68, Southdown Avenue.

Bristol Wireless Association (affiliated to Wireless Society of London)—**Pres.**, Rev. A. P. Rigby; **Hon. Sec. and Treas.**, A. W. Fawcett, 11, Leigh Road, Clifton, Bristol.

Burton-on-Trent Wireless Club (affiliated to Wireless Society of London)—**Pres.**, Col. J. Gretton, M.P.; **Hon. Sec.**, R. Rose, 214, Belvedere Road, Burton-on-Trent. Sub. 5s. per annum.

Cardiff and South Wales Wireless Society (affiliated to Wireless Society of London)—**Hon. Sec.**, W. G. J. Howe, 25, Plasturton Gardens, Cardiff.

Crystal Palace and District Radio Society—**Hon. Sec.**, W. E. Harper, 25, Beckenham Road, Penge, S.E.20.

Chiswick, Acton and District Amateur Wireless Association—**Hon. Sec.**, C. Hirst, 58, Agnes Road, Acton, W.3. Meetings held at 126, Cranbrook Road, Chiswick, W.

Derby Wireless Club (affiliated to Wireless Society of London)—**Hon. Sec. and Treas.**, Capt. W. Bemrose, Littleover Hill, Derby. Annual sub., 5s.

East Kent Wireless Society (affiliated to Wireless Society of London)—**Pres.**, Major Martin; **Hon. Sec.**, H. A. S. Gothard, 8, Longford Terrace, Folkestone.

Edinburgh Wireless Club (affiliated to Wireless Society of London)—**Hon. Sec.**, W. Winkler, 9, Ettrick Road, Edinburgh.

Exeter and District Wireless Society—**Hon. Sec.**, H. E. Allcock, 11, Richmond Road, Exeter.

Glasgow and District Radio Club (affiliated to Wireless Society of London)—**Hon. Sec. and Treas.**, R. Carlisle, 40, Walton Street, Shawlands, Glasgow.

Glevum Radio and Scientific Society—**Hon. Sec.**, J. Mayall, Benfield Lodge, St. Paul's Road, Gloucester.

Gloucester Wireless and Scientific Society—**Hon. Sec.**, J. J. Pittmann, 1, Jersey Road, Gloucester.

Greenwich Wireless Society—**Hon. Sec.**, A. F. Borke, 27, Kidbrook Park Road, Blackheath, S.E.

Halifax Wireless Club (affiliated to Wireless Society of London)—**Hon. Sec.**, L. Pemberton, Y.M.C.A., Clare Hall, Halifax. Transmitting Licence up to 10 watts. 180 and 1,000 kw. Hours, 8—10 p.m.

Huddersfield Y.M.C.A. Wireless Society—**Sec.**, F. Simpson, 3, Daisy Street, St. Andrew's Road, Huddersfield.

Leicestershire Radio Society (affiliated to Wireless Society of London)—**Hon. Sec.**, W. E. Dunt, 45, Baden Road.

Liverpool Wireless Association (affiliated to Wireless Society of London)—**Sec.**, J. Coulton, 95, Ampthill Road, Liverpool.

Luton Wireless Society—**Hon. Sec.**, W. F. Neal, Hitchin Road Boys' School, Luton.

Manchester Wireless Society (affiliated to Wireless Society of London)—**Hon. Sec.**, Y. W. P. Evans, 7, Clitheroe Road, Longsight, Manchester. Headquarters, 335, Oxford Street, Manchester. Annual Sub., 10s. 6d. members, 5s. associate members.

Manchester Y.M.C.A. Wireless Club—**Sec.**, A. Day, 56, Peter Street, Man. Newcastle and District Amateur Wireless Association—**Hon. Sec.**, Colin Bain, 51, Grainger Street, Newcastle-on-Tyne.

North London Wireless Association—**Sec.**, J. W. S. Prior, c/o Supt., Peabody Buildings, Essex Road, N.1.

North Middlesex Wireless Club (affiliated to Wireless Society of London)—**Hon. Sec.**, E. M. Savage, "Nithsdale," Eversley Park Road, Winchmore Hill,

London, N.21. Sub., 5s. per annum full members; 3s., corresponding members. Tel.: Palmers Green 797.

North Staffordshire Railway Electrical Department Wireless Club—Sec., P. E. Banks, 87, Spencer Road, Shelton, Stoke-on-Trent.

Nottingham and District Wireless Society—Hon. Sec., J. H. Gill, 18, Fourth Avenue, Sherwood Rise, Nottingham.

Oxford Amateur Wireless Society (for Juniors)—Hon. Sec., S. Barter; Asst. Sec., P. R. Bunce, 7, Bartlemas Road, Oxford. Maximum age, 18.

Plymouth Wireless Society (affiliated to Wireless Society of London)—Pres., W. S. Templeton, M.A., B.Sc., A.M.I.E.E.; Hon. Sec., H. P. Mitchell, Municipal Technical School, Tavistock Road, Plymouth.

Portsmouth and District Wireless Association—Hon. Sec., R. G. H. Cole, 32, Bradford Road, Southsea.

Preston Scientific Society—Sec., W. J. Bryce, 119a, Fishgate.

Radio Scientific Society of Manchester (affiliated to Wireless Society of London)—Hon. Sec., P. Thomason, 7, Brazennose Street, Manchester.

Rugby and District Wireless Club—Hon. Sec., A. T. Cave, 3, Charlotte St.

Sheffield and District Wireless Society (affiliated to Wireless Society of London)—Pres., H. E. Yerbury, M.I.C.E., M.I.E.E., M.I.M.E.; Hon. Sec., L. H. Crowther, A.M.I.E.E., 156, Meadow Head, Norton Woodseats. Sub., 15s. per annum full members, 7s.6d. student members, and 5s. corresponding members. Meetings fortnightly, on Fridays at 7.30 p.m., held in Sheffield Municipal Officers' Club.

Southport Wireless Experimental Society (affiliated to Wireless Society of London)—Hon. Sec., H. Sutton, 62, Marshside Road, Southport.

Stockport Wireless Society (affiliated to Wireless Society of London)—Hon. Sec., Z. E. Faure, 3, Banks Lane, Stockport.

Stoke-on-Trent Wireless Club—Hon. Sec. and Treas., G. H. Adams, 23, Park Terrace, Tunstall, Stoke-on-Trent.

Sussex Wireless Research Society (affiliated to Wireless Society of London)—Hon. Sec., J. E. Sheldrick, B.Sc., Eng., 35, Southdown Avenue, Brighton.

Three Towns Wireless Club (affiliated to International Society of Radioists and Wireless Society of London)—Pres., Major the Hon. Waldorf Astor; Acting Sec., G. H. Lock, 9, Ryder Road, Stoke, Devonport. Sub., 5s. per annum.

Tynemouth Y.M.C.A. Amateur Wireless Society—Sec., L. L. Sims, Y.M.C.A., Redford Street, North Shields.

Walsall Amateur Radio Club—Hon. Sec., E. W. Bridgewater, 17, White St.

Walthamstow Amateur Radio Club—Sec., K. Hardie, 58, Ulverston Road, Upper Walthamstow.

Wellingborough Red Triangle Radio Society—Sec., H. W. Dunkley, Oxford Street, Wellingborough.

Wireless and Experimental Association (affiliated to Wireless Society of London)—Hon. Sec., G. Sutton, 18, Melford Road, East Dulwich, London, S.E. Meetings every Wednesday.

Wireless Club of Rotherwood and District—Hon. Sec., J. F. Trevor, Eureka Lodge, Rotherwood, Ashby-de-la-Zouch.

Wireless Society of East Anglia—Hon. Sec., Chas. Thayne, 29, St. Andrew's Street, Norwich.

Wireless Society of Epsom—Hon. Sec., E. J. Alway, 38, Miles Road, Epsom.

Wireless Society of Glasgow—Hon. Sec., W. Bucannon, 2, Drive Road, South Govan, Glasgow.

Wireless Society of Hull and District (affiliated to Wireless Society of London)—Hon. Sec., H. Nightscales, 16, Portobello Street, Holderness Road, Hull.

Wolverhampton Wireless Telegraph and Telephone Association—Hon. Sec., A. Lawton, Essington House, near Wolverhampton.

Woolwich Radio Society (affiliated to Wireless Society of London)—Pres., Col. Cousins, C.M.G., R.E.; Sec., W. T. James, 32, Lee Street, Plumstead, S.E.

UNITED STATES OF AMERICA.

Albany Wireless Club—H. S. Maguire, 814, Lancaster Street, Albany, N.Y.

Alpha Wireless Association—Valparaiso, Ind. Pres., M. E. Packman. Sec. and Treas., J. S. Webb, 757, Greenwich Street.

Amateur Wireless Telegraph Club of Calif.—Capitola, Calif., Box 55.

Amateur Radio Association of New Bedford—New Bedford, Mass., D. Tripp, 26, Ward Street.

Amateur Radio Research Club—St. Petersburg, Fla., Pres., Loren Davis; Sec., F. Klauman.

American Radio Relay League Inc.—Hartford, Conn. Sec., K. B. Warner, 721, Main Street.

Ark. Wireless Association—Little Rock, Ark. 216, W. 20th Street. G. O. Ranch.

Armour Radio Association, Chicago, Ill.—Pres., F. A. Goodnow; Sec. and Treas., R. Kenrick, 726, N. East Avenue, Oak Park, Ill. Call Letters, 9YL.

Astoria Amateur Wireless Association—Astoria, Oregon. Pres., E. P. Hawkins, 377, Commercial Street.

Austin Radio Club—Austin, Tex. Sec., C. R. Granberry, Box 663.

Bedford Wireless Association—Hon. Sec., J. Corconan, 470, Gates Avenue, Brooklyn.

Bellevue Radio Chain—Lincoln Avenue, Bellevue, Pa. C. Wray.

Birmingham Wireless Association—1428, North 12th Avenue, Birmingham, Ala. Sec., H. L. Ansley.

Bloomfield Radio Club—Bloomfield, N.J. Pres., F. J. McKinney, 300, Glenwood Avenue.

Boy Scouts Radio Club—Bloomfield, N.J. Pres., Munro de Forest; Radio Instructor, Fred. J. McKinney. Boy Scouts Headquarters, Trust Company Building, Bloomfield, N.J., U.S.A.

Brown University Radio Club—Providence, Rhode Is. Pres., E. Standish Palmer; Sec. and Treas., John J. Csepely, Wilson Hall, Brown University, Providence.

Burlington High School Experimental Station—Burlington, Iowa. Principal, Wm. H. Peters. Damped wavelength 400 to 4,000 M. Normal wavelength 500 M. Day range 750 miles. Power 1 kw.

Cape May County Radio Association—Wildwood, N.J. E. Schlichting, 224, E. Burk Avenue.

Carrollton Wireless Club—Carrollton, Ill. S. W. Pierson.

Central Radio Association—Little Rock, Ark. J. M. Clayton, D.M.

Central Radio Association—Urbana, Ill. C. S. Hunt, R.R. 12.

Central Radio Association—Indianapolis, Ind. H. Silcox, D.M.

Central Radio Association—Chanute, Kansas. H. B. Williams.

Central Radio Association—Independence, Kan. Pres., J. Jakowsky,

Central Radio Association—St. John, Kansas. D. Sheperd, D.M.

- Central Radio Association—Tiffin, Ohio. H. Buck.
- Central Radio Association—Van Wert, Ohio. L. Young, D.M.
- Chicago Wireless Association—Sec., Frederick D. Northland, 24, Scott Street, Chicago, Ill.
- Citrus Belt Radio Association—Pomona, Calif. Sec., H. Clewitt, 1006, S. Reservoir Street.
- Colorado Wireless Association—Y.M.C.A., Denver, Colo. H. Whitman, 2252, Washington Street.
- College of the City of N.Y.—N.Y. City. H. Kayser, 41, Convent Avenue.
- Crescent Bay Radio Association—2619 Highland Avenue, Santa Monica, Cal. Pres., I. St. Price; Sec. and Treas., Elmor Forsyth.
- Dallas Club—Dallas, Texas. Sec., B. F. Bridges, 118, South Poydras Street.
- Dorchester Wireless Association—Dorchester, Mass. Sec., R. F. Lufkin, 11, Grace Street.
- Dot and Dash Club—E. Orange, N.J. T. Borthers, 38, Amhurst Street.
- E. Buffalo Wireless Club—701, Walden Avenue, Buffalo, N.Y.
- East Tennessee Wireless Club—723, N. 3rd Street, Knoxville, Tenn.
- Englewood High School Wireless and Engineering Association—Chicago Ill. Willis E. Tower, Faculty Adviser, 62nd Street, and Stewart Avenue.
- Erasmus Hall High School—Flatbush Avenue, Brooklyn, N.Y. Principal, J. Herbert Low.
- Evergreen Radio Association—Hon. Sec., G. H. Roy, 681, Grandview Avenue, Evergreen, Long Island, N.Y.
- Experimental Club of Cincinnati—1214, Jackson Street, Cincinnati, Ohio.
- Experimenters' Radio Association—Pittsburgh, Pa. Sec., B. Lazich, 16, Eureka Street.
- Fargo Radio Association—Fargo, N.D. E. Hooper, Agricultural College.
- Gallatin Radio Club—Bozeman, Mont. Sec., E. H. Cutting.
- Glenside Wireless Association—Glenside, Pa. R. Harmer.
- Grape Belt Radio Association—Silver Creek, N.Y. Pres. and Acting Sec., Herbert A. Hiller, 139, Hanover Street, Silver Creek, N.Y.
- Groveland Park Radio Club—Hon. Sec., M. Bodley, 1992, Lincoln Avenue, St. Paul, Minn.
- Hackensack High School Wireless Club—Hackensack, N.J.
- Hamilton Radio Association—Hamilton, Ohio. S. Doron.
- Hamlin Wireless Association—2729, Noble Avenue, Chicago, Ill.
- Hawkeye Radio Association—Ames, Iowa. H. K. Sels, 131, Hyland Avenue.
- Hawkeye Radio Association of Iowa—Lamoni, Iowa, A. B. Church, Lamoni.
- Hawkeye Radio Association—Toledo, Iowa. R. Batcher.
- Helena Wireless Club—Y.M.C.A., Helena, Mont.
- Houston Radio Club (affiliated with the American Radio Relay League), Houston, Texas—1212, Prairie Avenue.
- Hyde Park High School Radio Club—Chicago, Ill. Asst. Principal, Charles H. Smith, Editor, *School, Science and Mathematics*.
- Institute of Radio Engineers—Alfred N. Goldsmith, Ph.D., Sec., C.C.N.Y., 140, St., and Convent Avenue, N.Y.
- International Society of Radioists—Executive Headquarters, Omaha.
- Interstates Radio Club of America—Hon. Sec., Herchberg, Barboursville; Pres., C. F. Claybough, 508, West Court Street, Paris, Ill.
- Ithaca High School Wireless Club—Ithaca, N.Y.

Kaw Valley
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Kaw Valley Radio Association—Topeka, Kansas. Pres., W. A. Beasley ; Sec. and Treas., S. P. Kingman, 1522, Mulvane Street.

Lewiston Radio Club—Lewiston, Idaho. G. Eaves.

Louisville Radio Club—1410, Starks Buildings, Louisville, Ky.

Luverne Radio Club—Luverne, Minn. Sec., N. A. Canfield.

Mahoning Valley Radio League—Niles, Ohio. L. Kovalik, 322, Hunter Street.

Manchester Radio Association—South Manchester, Conn. Sec., E. Dowling.

Mesa County Wireless League—Y.M.C.A. Grand Junction, Colo.

Miami Wireless Association—Miami, Fla. H. Henshaw, R.F.D.1.

Milwaukee Amateurs' Radio Club—Milwaukee, Wis., Teschan Laboratories, 2319-29, Wells Street—Pres., L. S. Baird ; Sec., R. A. Teschan. Tel., West 395. Weekly meetings, 8 p.m., Thursdays, in Trustees' Room, Milwaukee Public Museum. Annual sub., \$6.00.

National Amateur Wireless Association—326, Broadway, New York City. Pres., Guglielmo Marconi ; Acting Pres., J. Andrew White ; Sec., Harry L. Welker.

New England Amateur Wireless Association—Hon. Sec., W. E. Heckman, 119, Windermere Road, Auburndale, Mass.

New London Radio Club—C. S. Bailey, Y.M.C.A., New London, Conn., U.S.A.

New Mexico College Agriculture and Mechanic Arts—State College Radio Club, State College, New Mexico. R. W. Goddard, Mesilla Park, N.M. 5ZJ—375, 200 metres, 1 K.W. 60 cycles. Stations : College ; 5XD—500, 400, 200 metres, 1 kw. 60 cycles. 5CX—200 metres, $\frac{1}{4}$ kw. 333 cycles. Portable stations : 5FY and 5FZ—200 metres, 100 watt spark.

Norristown Radio Club—Main Street and Franklin Avenue, Norristown, Pa. Sec., E. Harold Gresh.

Nyack Y.M.C.A. Radio Club—Nyack, N.Y. M. E. Robertson, 98, Piermont Avenue.

Nycssa Radio Club—West End Presbyterian Church, N.Y. P. L. Tilden, Mount Hermon, Mass.

Peoria Radio Club—Peoria, Ill. Sec. and Treas., W. F. J. Fickeisen, 2420, Main Street, Peoria.

Philadelphia Amateur Radio Association—Hon. Sec., H. P. Holz, 1902, N, 11th Street, Philadelphia.

Philadelphia Radio Amateur Association—1611, Columbia Avenue, Philadelphia.

Pittsburgh Wireless Association—6031, Kirkwood Street, Pittsburgh, Pa.

Pomona Wireless Club—Pomona, Calif. Sec., H. Gates.

Port Huron Radio Club—Port Huron, Mich. C. Thompson, 815, Wall Street.

Power City Wireless Association—Niagara Falls, N.Y.

Progressive Radio Club—Chicago, Ill. Custodian, R. Slomer, 2434, Pear Port, Chicago.

Putnam Radio Association—Hon. Sec., G. C. Delage.

Radio Association of Md.—Arlington, Md. Bancroft Park. Sec., R. Dimling.

Radio Club—Irvington, N.J. Sec., A. Oechler, 55, Linden Avenue.

Radio Club of the Elijah D. Clark School—Hon. Sec., H. V. Bucher, Hollis, Long Island, N.Y.

Radio Club of Flint—Flint High School, Flint, Mich.

Radio Club of Framingham—Framingham, Mass. J. L. Reynolds, 135, Vanderbilt Hall, Sheffield Scientific School, New Haven, Ct.

- Radio Club of Hartford—Hartford, Conn. M. Steele, 378, Park Road.
- Radio Club of New Britain—New Britain, Conn. Sec., T. E. McCarthy, 20, Belden Street.
- Radio Club of Thomson—Thomson, Ga. C. Morris, 104, W. Hull Street.
- Radio Club of Union College—Pres., Ellsworth D. Cook, Schenectady, N.Y.
- Radio Club, Y.M.C.A.—Trenton, N.J. Sec., C. T. Gordon. (*This Club is temporarily disbanded pending erection of new Y.M.C.A. building.*)
- Radio Devils, The—Hon. Sec., T. S. Windom, 1048, E. Main Street, Columbus, 6.
- Radio Research Society of Mt. Vernon—Mt. Vernon, N.Y. W. Morgan, 149, Urban Street.
- Radio Telephone Club of Newhaven—267, William Street, West Haven, Conn. Pres., W. A. Talmage; Sec., R. S. Jackson. Formed August 28th, 1919.
- Radio Traffic Association—Hon. Sec., G. K. Seyd, 486, Decatur Street, Brooklyn, N.Y.
- Ravenswood Radio Association—1917, Warner Avenue, Chicago.
- Rogers High School Radio Club—Newport, R.I. C. N. Clarkson, 17, Gibbs Avenue.
- Sacramento Radio Club—Sacramento, Calif. Sec., R. Coover, 1613, 19th Street.
- Sacramento Wireless Signal Club—Sacramento, Calif., 2119, H. Street.
- San Antonio Radio Club—Hon. Sec., R. J. Oliphante.
- St. Paul Wireless Club—184, Walnut Avenue, Santa Cruz, Calif.
- Scott High Radio Club—Scott High School, Toledo, Ohio. Pres., E. H. Moll; Sec., D. Buckingham. Apparatus: 2 kw. Marconi Panel Set, short wave regenerative, 3-step amplifier for long wave and telephony; bulb telephony set.
- Senn Radio Association—Senn High School, Chicago, Ill.
- Southern Wireless Association—1435, Henry Clay Avenue, New Orleans, La.
- South Side High School—Newark, N.J. H. Wersfelder.
- Springfield Wireless Association—323, King Street, Springfield, Mass.
- Spring Hill Amateur Wireless Association—2, Benton Road, Somerville, Mass.
- Suburban Radio Club—Washington, D.C. C. Longfellow, Jr., 5515, Potomac Avenue.
- Technical Wireless Association—E. L. Powell, 216, Spruce Avenue, Takoma Park, Md.
- Technical Wireless Association—1206, E. Capitol Street, Washington, D.C.
- Terre Haute Radio Club—Terre Haute, Ind. Pres., Wayne Stewart; Sec. and Treas., Howard A. Derry, 1716, North Eighth Street. Tel., 4520.
- Toledo Radio Club—Pres., Dudley West, 3944, Hazelhavel Avenue, Toledo.
- Topeka Radio Club—Topeka, Kansas. R. L. Morehouse, Hyland Park.
- Tri-State Wireless Association—Memphis, Tenn. Pres., C. de La Hunt, 346, Winchester Avenue.
- Union County Radio Association—Roselle Park, N.J. 136, Westfield Avenue. Pres., F. H. Broome; Sec., R. E. Timbrook.
- Waco High School Radio Club—Waco, Tex. P. Deeby, 535, Proctor Avenue.
- Welcome Wireless Association—185, Chauncery Street, Brooklyn, N.Y.
- Wildwood Radio Association—Wildwood, N.J. L. Chalmers, 125, East Burk Avenue. Station Call Letters, 3ABL.
- Wireless Association of Central Pa.—409, Kelker Street, Harrisburg, Pa.
- Wireless Association, Ft. Smith—Pres., Jack D. Fink, Fort Smith, Ark.
- Wireless Association of Keene—172, Elm Street, Keene, N.H.
- Wireless Association of Montana—309, South Ohio Street, Butte, Mont.
- Wireless Association of New Orleans—New Orleans, La., 2022, State Street.
- Wireless Association of Penna—Odd Fellow Temple, Phila., Pa.
- Wireless Club of Y.M.C.A.—Gloucester, Mass. F. Essig, Y.M.C.A.

Wireless Society of Springfield—Box 562, Springfield, Mass.

Y.M.C.A. Wireless Club—Williamsport, Pa. 211, West Fourth Street.

Young Marconi's Wireless Association—Sec., P. H. Bolton, 1024, Erie Street, Youngstown, Ohio.

Young Men's Scientific Association—Hon Sec., S. Leben, 343, Newport Avenue, Brooklyn, N.Y.

AMATEUR CALL SIGNS

Call Sign.	Power in Watts.	Wavelengths in Metres.	Hours of Working (G.M.T.).	System.	Name and Town.
2AL	—	—	—	—	Marlborough College, O.T.C.
2AM	—	—	—	—	Marlborough College, O.T.C.
2AZ	—	—	3-4 p.m., 8-9 p.m. . .	C.W. and Telephony . .	Mr. William Le Queux, Guildford.
2CZ	10	150 and 180	11-12 a.m., 8-9 p.m.	Spark	Mr. C. T. Atkinson, Leicester
2DF	10	180 and 1,000	8-9 p.m., 10-11 p.m.	C.W. and Telephony.	Mr. H. Heather, Peckham.
2DG	10	180	7-8 p.m. Mondays to Fridays. (Other days hours of working are various.)	Spark and C.W.	Mr. Burnett, Sheffield.
2DH	10	180	Portable station . .	Spark and C.W.	Mr. Burnett, Sheffield.
2DI	10	180	Portable station . .	Spark and C.W.	Mr. Burnett, Sheffield.
2DT	—	—	—	—	Barrow and District Wireless Association.
2DV	10	180	—	Spark	Mr. H. C. Woodhall, Bramhall, Cheshire.
2FG	—	—	—	—	Mr. H. L. McMichael, West Hampstead, N.
2FH	—	—	—	—	Mr. T. I. Rogers, Moseley.
2FN	—	—	—	—	Mr. L. Baker, Ruddington, Notts.
2FW	—	—	Portable station . .	Spark	Rev. D. Thomas, St. Paul's B.P. Scouts, Bournemouth
2FX	—	—	8-9 p.m. Mondays to Fridays. (Other days hours of working are various.)	Spark, C.W., T.T. and Telephony	Mr. H. C. Binden, Bournemouth.
2GP	—	—	8.30-10.30 p.m. . .	Spark, C.W., T.T. and Telephony	Mr. W. Gaitland, Highbury, N.
2GR	—	—	12.30-1 p.m., 5.30-7 p.m.	—	Mr. T. Forsyth, Ashington.
2GS	—	—	Portable station . .	—	Mr. T. Forsyth, Ashington.
2GU	10	180 and 1,000	8.10 p.m. . .	—	Halifax Wireless Club.
2GW	—	—	7.30-9.30 p.m. . .	—	Mr. A. Cash, Lymm, Ches.
2GZ	—	180 and 1,000	—	Spark and C.W.	Mr. A. L. Megson, Bowden.
2HA	—	180 and 1,000	Portable station . .	—	Mr. A. L. Megson, Bowden.
2HB	10	180 and 1,000	8.10 p.m.	Spark and C.W.	Mr. L. H. Lomas, Macclesfield.
2HG	—	—	12.30-1 p.m. . .	—	Mr. T. Boutland (Snr.), Ashington.
2HH	—	—	5.30-7 p.m. . .	—	Mr. T. Boutland (Jnr.), Ashington.
2HP	—	—	12.30-1 p.m. . .	—	Mr. T. Boutland (Jnr.), Ashington.
2ID	10	180	5.30-7 p.m. . .	—	Mr. H. C. Woodhall, Salford.
2II	—	180	3.30-4.30 p.m. . .	Spark and C.W.	Mr. E. S. Firth, Thames Ditton.
2IJ	—	—	8.30-9.30 p.m. . .	—	Southport Wireless Experimental Society.
2IK	—	—	8-10 p.m.	—	Southport Wireless Experimental Society.
2IL	—	—	Portable station . .	—	3rd Altrincham Troop Boy Scouts, Altrincham.
2IU	10	180	Portable station . .	—	3rd Altrincham Troop Boy Scouts, Altrincham.
2IW	10	180	9-11 p.m.	—	Mr. G. A. E. Roberts, Twyford.
2JK	10	180 and 1,000	9-11 p.m.	—	Mr. G. R. Marsh, Twyford.
2PF	10	180	8.30-10.30 p.m. . .	Spark, C.W., T.T. and Telephony	Mr. P. R. Coursey, Muswell Hill, N.10.
				Spark	Mr. F. Foulger, London, S.E.14.

LIST OF WIRELESS TELEGRAPH COURSES IN COLLEGES AND SCHOOLS

(N.B.—Those schools marked with an asterisk (*) are devoted solely to the teaching of Radiotelegraphy and Telephony.)

Name of College or School.	Address.	Duration of Course.	Fee.	Hours of Attendance.	Age (most suitable)	Remarks.
AUSTRALIA *Marconi School of Wireless	97/9, Clarence Street, Sydney, N.S.W., and 422/4, Chancery Lane, Melbourne, Vic.	—	£50	0930—1630 (Mon. to Fri.) 1900—2100 (Mon., Wed., Thursday)	—	
BELGIUM *Antwerp School of Radiotelegraphists	5-7, Rue du Lombard, Antwerp, Belgium	9 months	Gratis (Day Course) Frs. 20 monthly (Evening Course)	0900—1200 1400—1700 1900—2100 (Daily) 0900—1300 (Sat. only)	17—24	
*Ostend School of Radiotelegraphists	Caserne des Pompiers, Rue de Bruges, Ostend, Belgium	9 months	Gratis (Day Course) Frs. 20 monthly (Evening Course)	0900—1200 1400—1700 1900—2100 (Daily) 0900—1300 (Sat. only)	17—24	
BOLIVIA *Radiotelegraphic School	La Paz	—	—	—	—	This school is under the direction of M. Humberto Asin, the Superintendent of Radiotelegraphy in Bolivia.
BRAZIL *Marconi Wireless School	107, Rua 1 ^a de Março, Rio de Janeiro	—	35 Mils. monthly	1200—1400 1430—1600 1900—2100	—	This school is conducted by Marconi's Wireless Telegraph Co., Ltd.
CANADA *Marconi Wireless Telegraph Co., of Canada, Ltd.	93, King Street, East, Toronto	—	\$20 monthly (Day Classes) \$10 monthly (Night Classes)	0900—1200 1330—1600 (Daily) 1930—2130 (Evenings) (Mon., Wed., Friday, Saturday excepted)	16 and upwards	‡ kw. Canadian Marconi Cabinet Set; ‡ kw. Marconi Wireless Telephone Set.
*Marconi Wireless Telegraph Co. of Canada, Ltd.	Montreal, Quebec	—	\$15 monthly (Afternoon Classes) \$10 monthly (Evening Classes)	1400—1700 (Daily) 1930—2200 (Mon., Wed., and Friday evenings, Saturday excepted)	16 and upwards	School located at Marconi Factory, so all types of apparatus available.

Canadian School of Telegraphy (Wireless, Cable and Landline Telegraphy)	Hatifax, N.S.	12 months' Course	\$1000	16—25	Marconi apparatus.
Disabled Soldiers' Civil Re-establishment School	Borden Barracks, Halifax, N.S.	—	No Fees. School maintained by Government, in the interests of Returned Soldiers	18—25 usually, but no limit actually set	Marconi apparatus.

Canadian School of Telegraphy (Wireless, Cable and Landline Telegraphy)	Halifax, N.S.	..	..	12 months' Course	\$1000	0900—1200 (Daily) 1400—1600 (Daily) 1930—2130 (Nightly) 0830—1230 (Nightly) 1330—1730 (Daily) 0830—1230 (Saturdays)	16—25	Marconi apparatus.
Disabled Soldiers' Civil Re-establishment School	Borden Barracks, Halifax, N.S.	..	..	—	No Fees. School maintained by Government, in the interests of Returned Soldiers	18—25 usually, but no limit actually set	18—25 usually, but no limit actually set	Marconi apparatus.
Western Collegiate Institute, Ltd.	119, Pender Street, W., Vancouver, B.C.	..	..	—	\$25 monthly (Day Course) \$10 monthly (Saturday excepted) \$22 monthly (Two nights per week) \$22 monthly (Day Course) \$12 monthly (Evening Course)	15 and upwards	15 and upwards	Marconi $\frac{1}{2}$ kw. Cabinet Set.
"Spratt-Shaw," Victoria Business Institute, Ltd.	Victoria, B.C.	..	..	—	0900—1200 1300—1500 (Daily, Saturday excepted) 1930—2230 (Mon. and Thursday Evenings)	18 and upwards	18 and upwards	Marconi $\frac{1}{2}$ kw., with Emergency Set.
Kelvin Technical High School	Winnipeg	..	..	—	\$2 per term, which fee is returned if student attends $\frac{1}{2}$ of lectures \$2 per term, which fee is returned if student attends $\frac{1}{2}$ of lectures	14 and upwards	14 and upwards	Composite Apparatus.
St. John's College	Winnipeg	..	..	—	1930—2130 (3 Evenings weekly) (No Day Classes) 1930—2130 (3 Evenings weekly) (No Day Classes)	14 and upwards	14 and upwards	
Cassan's Wireless School..	Toronto, Ont.	..	..	—	\$20 monthly (Day Classes) \$10 monthly (Evening Classes)	No age limits given	No age limits given	$\frac{1}{2}$ kw. Marconi Set.

List of Wireless Telegraph Courses in Colleges and Schools—continued

(*) are devoted solely to the teaching of Radiotelegraphy and Telephony.)

Name of College or School.	Address.	Duration of Course.	Fee.	Hours of Attendance.	Age (most suitable).	Remarks.
CANADA—contd. *Shaws Wireless School ..	Toronto, Ont.	—	\$18 monthly (Day Classes) \$12 monthly (Evening Classes)	0900—1600 (Daily) 0900—1200 (Saturday) 1030—1200 (Mon., Wed. and Friday Evenings)	No age limits given	½ kw. Marconi Set.
CHINA *Radio Training Station	Peking ..	—	—	—	—	Under the control of the Chinese Ministry of Communications.
FRANCE Ecole du Génie Civil et de Navigation (Section de T.S.F.)	152, Avenue Wagram and Boulevard Pereire, Paris (17e)	from 3-10 months	150-2000 francs	0845—0945 1000—1100 1115—1145 1430—1545 1600—1730 1745—1845 2030—2230	—	
*Ecole de Radiotélégraphie du Champ de Mars	69, rue Fondary, Paris (15e)	5-6 months	550 frs. plus 20%	—	16 years & upwards	
NEWFOUNDLAND *Marconi Wireless Telegraph Company of Canada, Ltd.	St. John's, Newfoundland ..	—	—	1000—1200 1500—1700 (Daily)	15—25	Marconi Apparatus.
SPAIN *Commercial Wireless School	Teverga Mas Serrano Luna, 5, Madrid	—	35 pesetas monthly	1700—2100	—	School established for the training of young men for the Spanish Government's Certificate for Wireless Operators.
UNITED KINGDOM British School of Telegraphy, Ltd.	179, Clapham Road, London, S.W.	46 weeks 46 weeks	32 guineas (Day Course) 12 guineas (Evening Course)	0930—1300 1400—1630 (Saturday excepted) 1900—2100 (Mon., Wed., Friday)	17—24	This comprises instruction in the general principles of Wireless Telegraphy (Theoretical and Technical), including wiring, testing and maintenance. Practical instruction is also given in the manipulation of all kinds of Wireless and Land Line Telegraph apparatus, the working of a ½ kw. Standard Marconi Set, the management of Gas and Dynamometers, Converters and the care of Accumulators, etc.

This includes the manipulation of the telegraphic apparatus used for the reception of messages, the precise adjustment and manipulation of the various "Comrades" standard apparatus, the necessary coaching for obtaining the Postmaster-General's Certificate of Proficiency, and a comprehensive series of lectures, fully illustrated with diagrams, experiments, etc., enabling a student to qualify for the Wireless Telegraph Service.

25 weeks (30 hours per week)	407-444-1111 (Course)	0930-1230 (Saturday excepted)	15
20 guineas (evening Course)	1800-2000 (Saturday excepted)		
2 guineas monthly		0930-1630 (Saturday excepted)	17-24

Franklin Thompson Training College, Ltd.	Royal Technical College..	Glasgow	Sept
216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000	Sept		

student to qualify for the Wireless Telegraph Service.

The Wireless Classes have been arranged for persons desirous of qualifying for the Postmaster-General's Certificate of Proficiency in Wireless Telegraphy as a necessary preliminary to their employment as Wireless Operators.

Complete courses in Wireless Telegraphy, including Morse Code, Magnetism and Electricity, principles of Wireless Telegraphy, use and adjustments of a full size Marconi apparatus, Regulations for wireless operators.

Students are prepared for the examination for the Postmaster-General's Certificate of competency as wireless operators.

The various systems of wireless, including the Telefunken, are explained, but principally the Marconi system.

The various systems of wireless, including the Telefunken, are explained, but principally the Marconi system.

Royal Technical College..	Glasgow	.. ..	Sept. 21— April 1	2 guineas monthly	0930—1630 (Saturday excepted)	17—24	
The Marine School of South Shields	South Shields ..	.. ..	Sept. 27— May	£6	Day and Evening	14 and upwards	
*Kingston Wireless College	228, Aulaby Road, Hull	.. ..	9 months	2½ guineas (Day Course)	1000—1200 1400—1600 1900—2100	—	
			6 months	30 guineas (Day and Evening)			
			9 months	20 guineas (Evening Course)			
Technical School ..	Tavistock Road, Plymouth ..	.. ..	—	10 guineas	0900—1800 1400—1700 (Saturday excepted)	—	
*City School of Wireless Telegraphy, Ltd.	61, High Street, Manchester..	.. ..	8 months	1½ guineas (Day Course) Ex-service men	0930—1230 1400—1630 1900—2100 (Wed. after- noons and Saturdays excepted)	—	
			12 months	10 guineas 10 guineas (Evening Course) Ex-service men			
*City School of Wireless Telegraphy, Ltd.	66½ Corporation Street, Birmingham	.. ..	8 months	8 guineas 1½ guineas (Day Course) Ex-service men	0930—1230 1400—1630 1900—2100 (Wed. after- noons and Saturdays excepted)	—	
			12 months	10 guineas 10 guineas (Evening Course) Ex-service men			

List of Wireless Telegraph Courses in Colleges and Schools—continued

(N.B.—Those schools marked with an asterisk (*) are devoted solely to the teaching of Radiotelegraphy and Telephony.)

Name of College or School.	Address.	Duration of Course.	Fee.	Hours of Attendance.	Age (most suitable).	Remarks.
UNITED KINGDOM—contd. *North-Eastern Schools of Wireless Telegraphy	18, Eldon Square, Newcastle-on-Tyne	6-8 months (Day Course)	25 guineas (Day Course) 15 guineas (Evening Course)	0930-1230 1400-1630 (Saturday excepted) 1900-2100 (Thurs. and Saturday excepted)	—	
*Scottish Wireless College	41½, Union Street, Aberdeen	12 months 12 months	20 guineas (Day Course) 15 guineas (Evening Course)	1000-1200 1400-1630 (Saturday excepted) 1900-2100 (Four evenings weekly)	—	The school is fitted with Marconi apparatus and with a system of Morse practice circuit.
Municipal Technical School	Suffolk Street, Birmingham	30 weeks	£1 per session (not more than three evenings a week)	1830-2130 (Wed. and Saturday excepted)	17 and over	Classes are open to students of either sex.
Electrical Training College	Radio House, Manor Gardens, Holloway	7 months (Day Course) 9 months (Evening Course)	—	0930-1230 1400-1600 (Saturday excepted)	16-24½	Instruction is also given by correspondence with limited attendance for practical work.
Limerick School of Wireless and Inland Telegraphy Central Technical School	2, Catherine Place, Limerick Cookridge Street, Leeds	6 months —	17 guineas 15 guineas (Day Course) 5 guineas (Evening Course)	1000-1300 1500-1830 0930-1230 (Daily) 1400-1630 (Evening Course) 1900-2100 (Mon. and Wed. only)	—	
*North Wales Wireless Schools	The Wireless College, Carnarvon	12 months	(See Remarks Column)	0930-1230 1330-1530 (Saturday excepted) 1900-2100 (Evening Class)	—	Sea Wireless Course, 22 guineas; Land Wireless Course, 28 guineas; Postal Course for Wireless Operators, 15 guineas; Postal Course for Wireless Amateurs, 12 guineas; Evening Classes, 12 guineas; Cable Operators' Course, 18 guineas; Board-existence in College, 24 guineas per year. Work in Marconi, etc., and other apparatus, including the use of the Morse Code, and Continuous Wave System. Students with no previous knowledge of electricity or telegraphy will also receive instruction in the use of Electricity (General), Motors, Dynamos, Alternators, special reference to Transformers and Accumulators. Rotary Converter. The Morse Code.

List of Wireles.

*Liverpool Wireless Telegraph Training College
27, Leese Street, Liverpool

18 guineas 1000-1230
1330-1600
1900-2100 (Evening Class)
22 guineas 22 guineas
6 months 6 months
16½-24½

List of Wireless Telegraph Courses in Colleges and Schools 1347

		1400—1630	over		
*Liverpool Wireless Telegraph Training College	27, Lece Street, Liverpool ..	18 guineas (Day Course) 22 guineas (Evening Course) 25 guineas (Day and Evening Course) 34 guineas (per quarter)	1000—1230 1330—1600 1900—2100 Mon., Tues., Thurs., Fri.)	16½—24½	<p>graphy. The 1½ kw. Set and other Systems. Practical work in Marconi 1½ kw. Set. Theory and Practice of Thermionic Valves and Continuous Wave Systems. Students with no previous knowledge of electricity or telegraphy will also receive instruction in Magnetism and Electricity (General), Magnetism and Electricity, with special reference to Motors, Dynamos, Alternators, Rotary Converters, Transformers and Accumulators. Mathematics. The Morse Code.</p> <p>Private School.</p>
*Marconi School	Marconi House, Strand, London, W.C.	25 guineas (Day Course) 15 guineas (Evening Course) 25 guineas (Day Course) 15 guineas (Evening Course)	—	—	
*South Wales Wireless Training College, Ltd.	Market Buildings, S. Mary's Street, Cardiff	12 months	—	—	
*South Wales Wireless Training College, Ltd.	Neptune Chambers, Victoria Street, Bristol	12 months	—	—	
*North Eastern Schools of Wireless Telegraphy	6, Blenheim Terrace, Leeds ..	6-8 months (Day Course)	0930—1230 1400—1630 (Saturday excepted) 1900—2100 (Thurs. and Saturday excepted)	—	
North Eastern Schools of Wireless Telegraphy	Central Chambers, High Street, Sheffield	6-8 months (Day Course)	25 guineas (Day Course) 15 guineas (Evening Course)	—	
*Southern Counties Wireless School	33, High Street, Southampton	6-8 months (Day Course)	25 guineas (Day Course) 15 guineas (Evening Course)	—	

List of Wireless Telegraph Courses in Colleges and Schools—continued

(N.B.—Those schools marked with an asterisk (*) are devoted solely to the teaching of Radiotelegraphy and Telephony.)

Name of College or School.	Address.	Duration of Course.	Fee.	Hours of Attendance.	Age (most suitable).	Remarks.
UNITED KINGDOM—contd. The Atlantic Wireless and Submarine College	Caherciveen, Co. Kerry ..	—	30 guineas (Day Classes) 15 guineas (Evening Classes)	1000—1300 1400—1700 1900—2100	—	Plants installed: two $1\frac{1}{2}$ kw. Installations with Emergency Break and Coil Sets, one $\frac{1}{2}$ kw. Installation Synchronous Discharger. Generating Sets consist of 5 h.p. 3-phase Induction Motor direct coupled to 2 kw. D.C. Dynamo, one $3\frac{1}{2}$ h.p. Hornsby Oil Engine and one 2 kw. D.C. Dynamo, belt driven. Two 80 A.H. Batteries and one 144 A.H. Battery.
The Atlantic Wireless and Submarine College	45-47, Henry Street, Dublin..	—	30 guineas (Day Classes) 15 guineas (Evening Classes)	1000—1300 1400—1700 1900—2100	—	
Leith Nautical College	Commercial Street, Leith	—	£6	1000—1300 1400—1600 (Saturday excepted) 1900—2030 (Mon. only) 1900—2100 (Tues., Thurs., Friday)	—	
The Municipal College ..	Portsmouth	2 years	5 guineas per session	0090—1200 1400—1700 (Saturday excepted)	—	The first year of the Course is devoted to Electrical Engineering and the second to Wireless Telegraphy.
Rutherford Technical College and School of Art	Newcastle-on-Tyne	12 months	£1 per month	0915—1215 1415—1715 (Saturday excepted)	16 and over	
Wimbledon Technical Institute	Gladstone Road, Wimbledon, S.W.19	13 weeks	£5	0900—1200 1300—1600 (Saturday excepted)	—	
International Correspondence School Northern Wireless College and Cable School	Kingsway, London, W.C.2 .. 8, Corporation Street, Belfast	Until proficient	17 guineas 30 guineas (Day Classes) 1400—1630 (Saturday) 1600—1800 (Evening Classes)	0930—1230 1400—1630 1600—1800 (Saturday)	—	
Irish School of Telegraphy	15, Dyke Parade, Cork	3-4 months	—	1000—1200 (Saturday)	18—25	

in the shortest possible time for the Postmaster-General's Qualifying Examination for Proficiency in Radio-telegraphy. The instruction consists of Lectures and Practical Work in Technical Electricity and Technical Wireless Telegraphy, with special practice on the 1½ kw. Set, Morse training and instruction in the P.M.C.'s Handbook for Wireless Operators, etc.

Institute							16
Wolverhampton Technical School	Garrick Street, Wolverhampton	—	—	5 guineas (Evening Course)	1330—1630 (Day Course) 1900—2200 (Saturday excepted) 0930—1230 (Sat. only)	1915 (Tues. only) 0930—1600 (Saturday excepted) 1900—2100 (Thurs. and Evening Course)	—
*East London Telegraph College	228, Romford Road, Forest Gate, London, E.7.	—	—	8s. per session £27 6s. (Day Course) 18 guineas (Evening Course)	0930—1600 (Saturday excepted) 1900—2100 (Thurs. and Evening Course)	0800—1200 1330—1700 1600—1200 1400—1500 (Daily) 1900—2100 (Mon., Wed., Friday)	—
UNITED STATES							—
Dodge's Wireless Institute	Valparaiso, Indiana	5-6 months	\$85			1330—1700 1600—1200 1400—1500 (Daily) 1900—2100 (Mon., Wed., Friday)	—
*National Radio Institute	1345, Fern Avenue, Washington, D.C.	2-5 months	\$135			0930—1230	—
*Philadelphia School of Wireless Telegraphy	Parkway Building, Broad Street, Philadelphia, Pa.	4 months	\$25 monthly (Day Course)			1030—2130 (Mon., Wed., Friday)	—
Pacific Telegraph Institute	120, N. Wall Street, Spokane, Washington	5 months	\$16 monthly (Evening Course)			1900—2200 (Mon., Wed., Friday)	—
*Pennsylvania Marconi Wireless School	1708 Chestnut Street, Philadelphia, Pa.	5 months	\$20 monthly			0930—1230 1330—1600 (Daily) 1930—2130 (Mon., Tues., Thurs., Fri.) 0900—1525 (Saturday excepted)	—
Oregon Institute of Technology	Portland, Oregon	3-6 months	\$15 monthly			1915—2115 (Mon., Tues., Thurs., Fri.) 0800—1200 1300—1600 1930—2130	—
*Central Radio School	513, W. Lexington Street, Independence, Missouri	4-6 months	\$85				—

List of Wireless Telegraph Courses in Colleges and Schools—continued

(N.B.—Those schools marked with an asterisk (*) are devoted solely to the teaching of Radiotelegraphy and Telephony.)

Name of College or School.	Address.	Duration of Course.	Fee.	Hours of Attendance.	Age (most suitable).	Remarks.
UNITED STATES—contd. United Y.M.C.A. School. Browne's Business College	347, Madison Avenue, New York Flatbush Avenue, Brooklyn	— —	\$115 \$6 monthly	1930—2130 (Mon., Tues. Thursday) 0900—1300 (Saturdays excepted)	—	Correspondence Courses only.
Massachusetts Radio and Telegraph School	18, Boylston Street, Boston, Mass.	6 months	\$120	1000—2100 (Mon., Wed., Friday) 1000—1230 1330—1600 1930—2130	—	
*Radio School, East Side Branch, Y.M.C.A.	153, East 86th Street, New York	9 months	\$18 monthly	—	—	
		3 months	\$81 (Day Course) \$72 (Evening Course)	—	—	
*Westchester Radio School	253, South Broadway, Yonkers, New York	4 months	\$— monthly	1900—2130 (Tues. and Saturday) 1300—1700 1930—2145 (Saturday excepted)	—	
*Radio Institute of America	326, Broadway, New York	4 months	\$20 (Day Course) monthly	—	—	
		4-5 months	\$15 (Evening Course) monthly	—	—	
*Radio Institute of America	Call Building, San Francisco	—	\$10 monthly	1330—1630 1000—2100 (Saturday excepted)	—	
Uitmark's Nautical Academy Radio School	8, State Street, New York City	4 months	\$30 (Day Course) \$15 (Evening Course)	0900—1200 1300—1600 1900—2130	—	
Eastern Radio Institute	899, Boylston Street, Boston, Mass.	6 months 9 months	\$120 \$90	0900—1300 (Mon.—Fri.) 1900—2100 (Mon., Wed., Friday)	16	
VENEZUELA National School of Radiotelegraphy	Caracas, Venezuela	—	—	—	—	For the provision of native operators for the Venezuelan Radiotelegraphic Service.

CODE SECTION

(A) The Morse Code.

THE MORSE CODE

The Morse code used in all countries except America is known as "Continental Morse," to distinguish it from the original code invented by Samuel Morse and now used by America. All American wireless operators, however, must necessarily be proficient in the use of Continental Morse, and so the latter actually constitutes an international code.

Continental Morse is a dot and dash system, every letter or symbol consisting of a combination of these. Considering as an element either a dot or a dash, no ordinary unaccented letter is represented by more than four elements. Some punctuation signs, numerals and whole words are represented by more than four elements.

Rules for formation of Continental Morse code :

These rules apply irrespective of the speed of transmission.

- (1) The time occupied by a dash should be equal to that occupied by three dots.
- (2) The time occupied by the interval between two elements of one letter or other symbol should be equal to the time occupied by one dot.
- (3) The interval between two letters in a word should be equal to the time occupied by three dots.
- (4) The interval between two words should be equal to the time occupied by five dots.

Letters.

CONTINENTAL MORSE.

a	• —
ä	• — • —
á	• — • — • —
â	• — • — • —
b	— • • •
c	— • — •
ch	— • — • —
d	— • • •
e	•
é	• • — • •
f	• • — •
g	— • • •
h	• • • •
i	• •
j	• — • — • —
k	— • — •
l	• • — •
m	— • —
n	— •
ñ	— • — • — • —
o	— • — •
ö	— • — • •
p	— • — • —
q	— • — • — •
r	• — • •
s	• • • •
t	— •
u	• • — •
ü	• • — • — •
v	• • — • — •
w	— • — • — •
x	— • • • — •
y	— • — • — •
z	— • — • •

AMERICAN MORSE.

a	• —
b	— • • •
c	• • • •
d	— • • •
e	•
f	• — • •
g	— • — •
h	• • • •
i	• •
j	— • — • — •
k	— • — •
l	— • — •
m	— • —
n	— •
o	• •
p	• • • • •
q	• • — • •
r	• • • •
s	• • • •
t	— •
u	• • — •
v	• • • —
w	— • — • —
x	— • • • •
y	• • • • •
z	• • • • •

Figures.

CONTINENTAL MORSE.

1	• — — — —
2	• • — — —
3	• • • — —
4	• • • • —
5	• • • • •
6	— • • • •
7	— — • • •
8	— — • • •
9	— — — • •
0	— — — — •

AMERICAN MORSE.

1	• — — •
2	• • • •
3	• • • •
4	• • • •
5	— • • • •
6	— • • • •
7	— • • • •
8	— • • • •
9	— • • • •
0	— — — —

Abbreviated Continental Morse Figures.

1	• —
2	• • —
3	• • • —
4	• • • • —
5	• • • • •

6	— • • • •
7	— • • • •
8	— • • • •
9	— • • • •
0	— — — —

Punctuation and Other Signs.

CONTINENTAL MORSE.

Full stop	• • • • •	(.)	• • • • •
Semicolon	• • • • •	(;)	— — — — —
Colon	• • • • •	(:)	— — — — —
Comma	• • • • •	(,)	• • • • •
Note of interrogation, or, request for a repetition	• • • • •	(?)	• • • • •
Note of exclamation	• • • • •	(!)	— — — — —
Apostrophe	• • • • •	(')	• • • • •
Hyphen or dash	• • • • •	(-)	— • • • •
Fractional bar	• • • • •	(/)	— • • • •
Brackets. <i>This sign must be made both before and after the words which are to be bracketed</i>	• • • • •	()	— • • • •
Inverted commas. <i>Must be made before and after the words which are to be quoted</i>	• • • • •	(" ")	• • • • •
Underline. <i>Must be made before and after words which are to be underlined</i>	• • • • •		• • • • •
Preliminary call. <i>To precede every transmission</i>	• • • • •		— • • • •
Double dash. <i>Generally called the "break sign." The signal separating preamble from address, address from text and text from signature</i>	• • • • •	(=)	— • • • •
End of message	• • • • •		• • • • •
Error. Means, "Erase." Some operators, however, use the repetition signal	• • • • •		• • • • •
Invitation to transmit	• • • • •	(AS)	• • • • •
Wait	• • • • •		— • • • •
"Received" signal	• • • • •		• • • • •
Distress call. Formerly CQD, which some operators may still use	• • • • •	(SOS)	• • • • •
"All stations"	• • • • •	(CQ)	— • • • •
End of work	• • • • •	(SK)	• • • • •

Punctuation and Other Signs.

AMERICAN MORSE.

Full stop	..	..	..	..	..	(.)	• • — — • •
Semicolon	..	..	..	..	..	(:)	• • • • •
Colon	..	..	..	..	..	(:)	— — — • •
Comma	..	..	..	..	..	(,)	• — — —
Note of interrogation	..	..	..	..	..	(?)	— • • — •
Note of exclamation	..	..	..	..	..	(!)	— — — •
Apostrophe	..	..	..	..	..	(')	• • — • • — • •
Hyphen	..	..	..	..	..	(-)	• • • • • — • •
Dash	..	..	..	..	..	(—)	— • • • — • •
Fractional bar	..	..	..	..	..	(/)	•
Bracket (begin)	..	..	..	..	..	( ( )	• • • • • — •
Bracket (end)	..	..	..	..	..	( ) )	• • • • • • • • •
Inverted commas (begin)	..	..	..	..	..	(")	• • — • — •
Inverted commas (end)	..	..	..	..	..	(")	• • — • — • — •
Underline (begin)	..	..	..	..	..		• • — • — • •
Underline (end)	..	..	..	..	..		• • — — — • — •
Dollars	(\$)	• • • • • — • •
Pounds (sterling)	(£)	• • • • • • — • •
Capital letter		• • • • • — • •
Decimal point	(DOT)	— • • • • • —
Paragraph	(¶)	— — — — —
Per cent.		— — • — —
&		• • • • •

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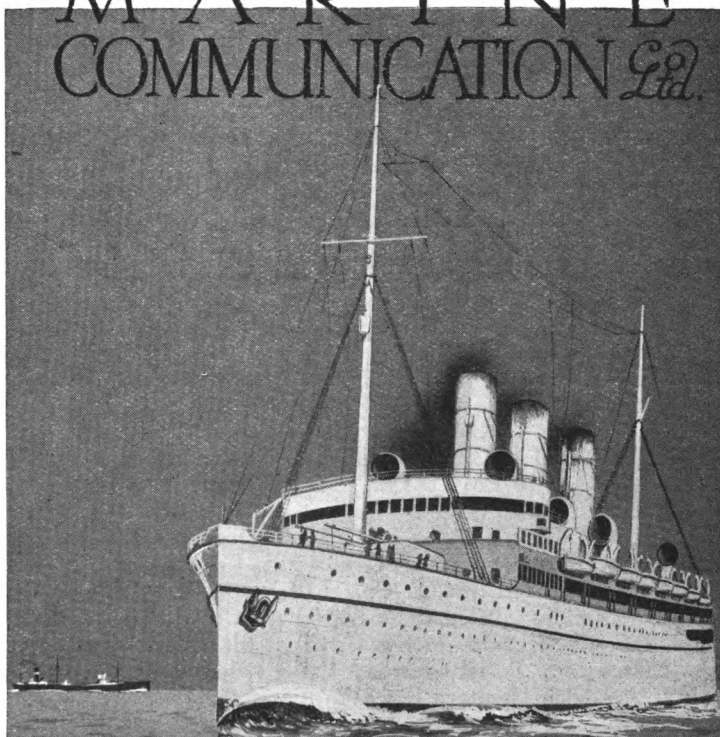
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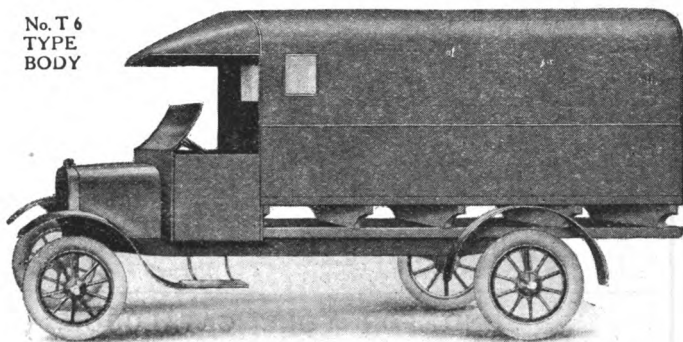
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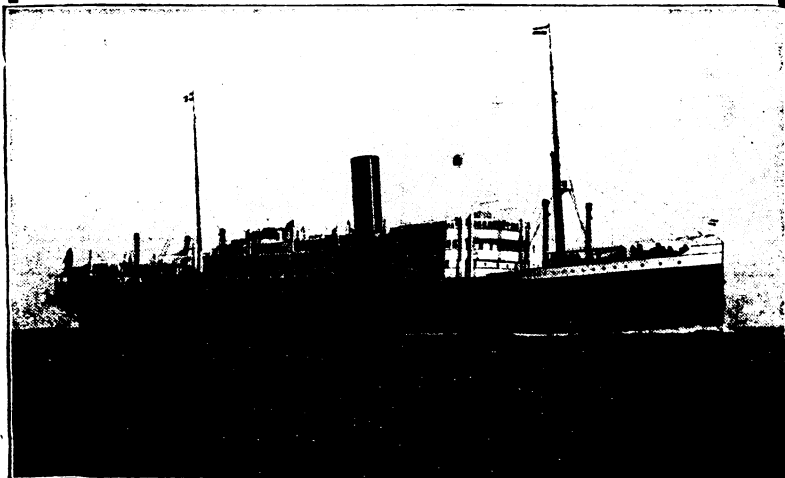
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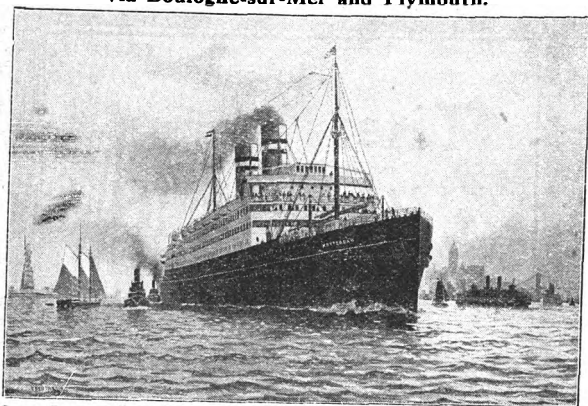
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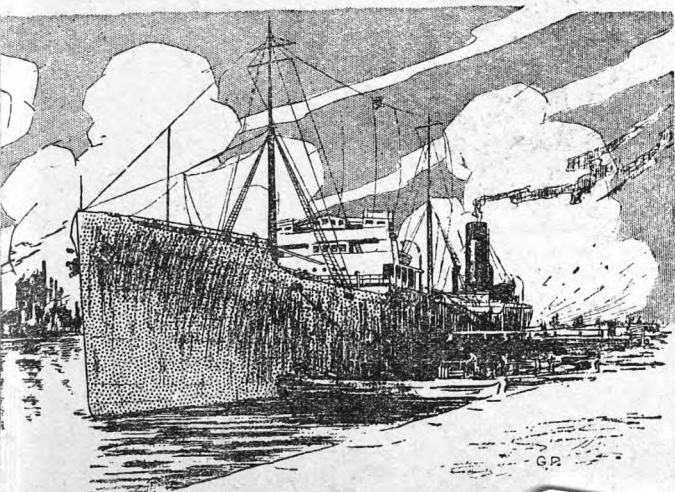
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